HOW DOES EMPLOYEE INFUSION USE OF CRM SYSTEMS DRIVE CUSTOMER SATISFACTION? MECHANISM DIFFERENCES BETWEEN FACE-TO-FACE AND VIRTUAL CHANNELS

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ABSTRACT

To attain customer satisfaction, service firms invest significant resources to implement customer relationship management (CRM) systems to support *internal* customer service (CS) employees who provide service to *external* customers in both face-to-face and virtual channels. *How* CS employees apply sophisticated CRM systems to interact with customers and *how* the mechanisms through which their CRM usage affects customer satisfaction vary across service channels and bear important implications. We approach these issues by investigating the concept of *infusion use*, defined as CS employees' assessment of the extent to which they use a CRM system to its fullest potential to best support their work in the CRM-enabled service interaction context. Drawing on the IS success framework and expectation confirmation theory, we first formulate a baseline model that explains the direct and indirect mechanisms through which CS employees' infusion use of CRM systems leads to customers' expectation confirmation, which in turn affects customers' satisfaction. We then draw on the lenses of media richness and communication adaptation to theorize why these two mechanisms exert differential influence in face-to-face and virtual channels. We test the hypotheses by collecting multi-wave data from CS employees, customers, and firm archives of a Fortune 500 telecom service firm. We find that (1) CS employee infusion use can *directly* contribute to customer expectation confirmation and *indirectly* do so through CS employees' satisfaction with the system (i.e., user satisfaction), and (2) the direct mechanism plays a more critical role in the face-to-face channel, whereas the indirect mechanism is more important in the virtual channel. Our findings inform managers of the avenues through which employees' infusion use promotes CRM-enabled service success across face-to-face and virtual service channels.

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1. Introduction

A service encounter between a frontline customer service (CS) employee (hereafter referred to as an employee) and a customer is the critical "moment of truth" in which the CS employee either satisfies or dissatisfies the customer (Bitner and Hubbert 1994). Since customer satisfaction is widely believed to be the best indicator of a firm's future profits (Moshavi 2006), service firms invest significant resources to implement customer relationship management (CRM) systems to support service encounters. As firms expand from single-channel to multi-channel service delivery, they deploy CRM systems widely to support their employees' interactions with customers in either face-to-face (e.g., retail stores (RSs)) or virtual (e.g., contact centers (CCs)) channels. As CRM payoff in a multi-channel environment is elusive (Zablah et al. 2012), we examine how CS employees use CRM systems to best serve customers in these service channels.

CRM systems record detailed information about customers, external market conditions, and internal offerings, thereby providing a rich pool of intelligence to CS employees (Goodhue et al. 2002). Moreover, CRM systems come with sophisticated functions that recommend appropriate CS employee responses to each customer based on the customer's profile (Sundaram et al. 2007), and they enable configure-to-order offerings to meet each customer's unique requirements (Mackintosh 2004). While information system (IS) use research (e.g., Saga and Zmud 1994; Sundaram et al. 2007) emphasizes the role of the infusion use of a system for realizing benefits from sophisticated systems such as CRM systems, the literature is largely silent on the mechanisms that underlie value creation from this infusion use and how the mechanisms differ across different service channels (e.g., RSs vs. CCs). Research is needed to fill these gaps and

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inform managers about how to benefit from their organizations' CRM systems—particularly in the context of multi-channel service provisioning, which is common today.

The concept of post-adoptive use refers to employees' system usage behavior after their organization implements an IS (Saga and Zmud 1994). During the post-adoptive stage, employees may extend the scope of the IS functions (Burton-Jones and Straub 2006; Hsieh et al. 2011), identify new ways to use the IS (Ahuja and Thatcher 2005; Li et al. 2013), and/or adapt their current usage behaviors (Schmitz et al. 2016; Sun 2012). Nonetheless, these behaviors are transitional by nature, as they represent the user's learning process toward achieving the highest state of IS use (Jones et al. 2002; Sundaram et al. 2007). In this regard, the notion of *infusion use,* defined as employees' self-assessment of the extent to which they use an IS to its fullest potential to best support their work, captures the ultimate state of IS use (Jones et al. 2002). However, the extant literature does not offer insights about whether CS employees' infusion use of CRM systems contributes to critical service outcomes such as customer satisfaction and, if yes, the mechanisms through which it does so.

Research on the mechanisms that underlie value creation through infusion use is important because it has implications for managers regarding practical avenues for realizing CRM payoff. Such research must take into consideration the salience of the CRM system usage context, which is CS employees engaging in intense interactions with customers during their technology usage.[1] The IS success framework implies that CS employees' infusion use of CRM systems can affect performance outcomes (e.g., customer satisfaction) directly and also indirectly through CS

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[1] Given that the goal of our research is to better understand CS employees' use of CRM systems to support encounters with customers, we investigate *operational* CRM (further elaborated in section 2.2) rather than *analytical* CRM applications, which are mainly used in back-office settings for analyzing customer data. The aim of our research also excludes customers' use of self-service technologies (e.g., kiosks) from our analysis. As such, "users" in this study refers to CS employees.

employees' satisfaction with the systems (DeLone and McLean 2003). Applying the general IS success framework to the specific context of service encounters, we submit that CS employees' satisfaction with CRM systems can play a role in their interactions with customers and, as a result, influence customer satisfaction. Thus, we view the success of CS employees' infusion use of CRM systems in service encounters as multi-stakeholder in nature, with a need to achieve both *internal* CS employee satisfaction with CRM systems and *external* customer satisfaction.

Reviews of research on IS use and IS success (Petter et al. 2008; Petter and McLean 2009) suggest that few studies have simultaneously examined the impacts/success of IS use (including post-adoptive use) across multiple stakeholders and that the literature is largely silent on CRM systems' multi-stakeholder impacts in service encounters. Moreover, most studies on IS use and IS success confine their scope to the organization without elaborating on the downstream impact of system use beyond organizational boundaries (e.g., external customers) and the mechanisms through which IS use exerts such influences. To bridge these gaps, we follow the IS success framework and conceptualize the *mechanisms underlying CRM system success in service encounters* as pathways from CS employees' infusion use to customer satisfaction. The preceding discussion motivates our first research question:

> *RQ1: What are the mechanisms through which internal CS employee infusion use of CRM systems affects external customer satisfaction?*

More importantly, there are in general two types of service encounters between CS employees and customers: (1) traditional *face-to-face* service encounters taking place in RSs and (2) real-time *virtual* service encounters in CCs, which are facilitated by communication technologies (phone, instant messaging, web chat, short message service, etc.) (Overby et al. 2010). A rich body of literature has outlined the differential capabilities of face-to-face and virtual channels in supporting interpersonal interactions (e.g., Daft and Lengel 1986; Dennis et al.

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2008; Straub 1994). Recent studies have also suggested that IS impacts are contingent on the contexts of IS use (Teo et al. 2008; Vogel et al. 2010). As CCs differ from face-to-face service channels such as RSs in supporting interpersonal interactions between CS employees and customers (Overby et al. 2010), it is plausible that the strength of the mechanisms through which infusion use affects customer satisfaction may vary across these channels. If so, managers must resort to different mechanisms for CRM system success in distinct channels. As most IS success studies do not compare the strength of mechanisms across face-to-face and virtual service channels, prior literature offers limited insights in this regard, thus our second research question:

RQ2: How does the strength of the mechanisms through which internal CS employee infusion use of CRM systems affects external customer satisfaction differ between face-to-face and virtual service channels?

2. Theoretical Background

2.1 Post-Adoptive Use

Post-adoptive use refers to individual IS usage behaviors after an organization adopts and implements an IS (Saga and Zmud 1994). After employees start using an implemented IS and routinely use that IS as part of their normal activities (i.e., routine use) (Li et al. 2013), the barrier to obtaining IS benefits is no longer the "quantity" of use (i.e., the amount of time spent using the IS), but rather the "quality" of use (DeLone and McLean 2003). Similar to the contrast between quality and quantity, Sundaram et al. (2007) compared various usage behaviors and found that although an employee may spend much of his or her work time using an IS, the employee may not necessarily experience increased work performance. Instead, whether the employee can effectively leverage the full potential of the system to best support his or her work is a more important consideration as it may lead to better performance.

Research on post-adoptive IS use notes that, after employees' initial use of an IS, they

gradually become more familiar with the IS and transition to a state of routine use in which using the IS becomes a normal and standardized part of their work routines. However, the potential of the IS may not be fully realized if employees' routine use of the system remains at a superficial level (Li et al. 2009; Saga and Zmud 1994). To move beyond superficial use, employees may engage in different IS use behaviors. For example, they might extend the scope of the IS functions they use (e.g., deep structure use [Burton-Jones and Straub 2006]), identify innovative ways to use the IS (e.g., innovative use [Li et al. 2013]), expand the scope of inter-related tasks supported by the IS (e.g., breadth of use [Saga and Zmud 1994]); or combine these use behaviors (e.g., adaptive use [Sun 2012], enhanced use [Bagayogo et al. 2014]). While a rich variety of such constructs can be used to characterize the different usage behaviors in the post-adoptive stage, these behaviors are transitional in nature, as they represent users' learning processes toward achieving the ultimate state of IS use (Saga and Zmud 1994; Schwarz 2003; Sundaram et al. 2007). Given that infusion use describes employee users' highest level of use of the IS in various aspects (e.g., scope of functions, inter-related tasks, and usage fashions) during the post-adoptive stage of the IS implementation process (Saga and Zmud 1994), infusion use is an ideal construct for capturing the ultimate state of employee users' IS usage.

2.2 Infusion Use in the CRM Context

The concept of infusion is rooted in organizational-level IS research that examines how fully information systems are integrated into organizations (Saga and Zmud 1994). At the organizational level, infusion represents the ultimate stage of IS implementation in which an IS is deeply and comprehensively embedded in organizational work processes (Saga and Zmud 1994). Saga and Zmud (1994) propose three behaviors that may occur during this stage: (1) using more of the available IS functions to support a more comprehensive set of tasks (i.e., extended

use); (2) using the IS to establish or enhance workflow linkages among a set of tasks (i.e., integrative use); and (3) using the IS to accomplish tasks that were not feasible or recognized prior to its application (i.e., emergent use) (Saga and Zmud 1994). Conceptually, these three usage behaviors represent (1) a wider range of available IS functions being applied, (2) a greater scope of inter-related tasks integrated by the IS, and (3) an increased number of ways in which the IS is used to support employees' work. Empirically, Jones et al. (2002), Schwarz (2003), and Sundaram et al. (2007) apply the infusion concept at the individual level and operationalize individual-level infusion use by measuring the extent to which a user believes that he or she is applying the full range of an IS's functions to support his or her work in the best possible manner. In essence, in the system users' work task context, individual-level infusion use reflects their self-assessment regarding fully applying the system to best support their tasks.

The context for this study is CS employees using CRM systems in service encounters. To support service encounters and enhance customer value from the service encounters, CS employees need timely, reliable, and accurate information that provides a complete picture of customers, external market information, internal offerings, a pool of effective solutions to address customers' requests, and recommendations about follow-up activities to strengthen long-term relationships with customers (Bolton and Tarasi 2006).

CRM systems play a key role in supporting CS employees' service work. To help CS employees better understand customers' needs and preferences, CRM systems record detailed information about customers, such as their profiles, responses to campaigns and promotions, and request and purchasing histories (Goodhue et al. 2002). This customer information, together with information regarding the external market (e.g., demand trends, competitor offerings, and local market conditions) and the firm's offerings (e.g., products, services, promotions, up-sells, cross-

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sells, and phase-in and phase-out information), constitute a rich pool of information that makes business intelligence available to CS employees. For instance, CS employees at Ritz Carlton use the company's extensive database regarding the unique preferences of individual customers to delight guests by anticipating their needs and providing unexpected services, such as greeting a customer who phones in a wake-up call request by name and asking whether she would, as usual, prefer room service for breakfast (Bitner et al. 2000; Piccoli and Watson 2008).

In addition, to help CS employees effectively address customer requests, CRM systems have functions to recommend appropriate CS employee responses based on customer profiles when interacting with specific customers (Sundaram et al. 2007) and to enable configure-to-order offerings to meet each customer's unique requirements (Mackintosh 2004). For example, CS employees at AT&T use frontline support technologies to extract and synthesize additional information beyond the regularly used functions to attain further insights about customer requests, provide customized service offerings, and obtain information about follow-up activities that can strengthen relationships with customers (Bolton and Tarasi 2006).

With the support of all of its available functions, infusion use of a CRM system enables CS employees to understand customer needs and preferences, access pertinent information, and respond to customer inquiries. In essence, unlike various use behaviors in the transitional state of post-adoption, infusion use focuses on the quality of use and reflects an ultimate state of post-adoptive behavior in which CS employees use CRM systems to their fullest potential to support the comprehensive set of tasks associated with their work in the best possible fashion.

While most post-adoptive use research has investigated the factors that drive employees' use of an implemented IS (e.g., Li et al. 2013), some has highlighted the importance of examining the *outcomes* of post-adoptive use, because what practitioners care about most are the

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benefits that IS use can bring about (e.g., Bala and Venkatesh 2013). To the best of our knowledge, only one study has shown that sales personnel's infusion use of sales force technology leads to better sales outcomes (Sundaram et al. 2007). The literature is largely silent about the performance impact of employees' infusion use of complex organizational IS in other contexts (including the service encounter context) and, more importantly, about the mechanisms through which performance benefits accrue.

Next, we draw on (1) the IS success literature to identify plausible mechanisms through which infusion use of CRM systems by CS employees can affect their service performance to ultimately satisfy customers and (2) the service marketing literature to identify the performance benefits for both CS employees and customers in the CRM-enabled service encounter context.

2.3 IS Success: Use, User Satisfaction, and Performance Benefits

According to the IS success framework (DeLone and McLean 2003), there are two mechanisms through which IS use generates performance benefits. First, employees' IS use can directly impact their performance. Second, employees' IS use can affect their satisfaction with the implemented systems, which then contributes to their performance.[2]

The literature has progressively developed a view of *needs fulfillment* to conceptualize user satisfaction. Au et al. (2008) conceptualize user satisfaction as a user's evaluation of needs fulfillment through an IS. Extending this line of research, Hsieh et al. (2012) investigate CS employees' CRM system use to support service encounters and define user satisfaction as CS employees' assessments of the extent to which a CRM system fulfills their work needs to provide high-quality service to customers. Grounded in the literature, we thus define *CS*

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[2] While their original IS success framework suggested a reciprocal relationship between system use and user satisfaction, DeLone and McLean (2003) updated the model and clarified that the direction should be (1) first from use to user satisfaction, as usage behaviors must precede user satisfaction, and (2) then from user satisfaction to an intention to (continue) use. Hence, we adopt this single directional link from use to user satisfaction.

employee user satisfaction as CS employees' evaluative attitudes about their experiences using CRM systems to fulfill their work needs in order to provide high-quality service to customers.

To examine the performance benefits of IS use in service encounters, we study the impact of CS employees' infusion use of CRM systems on one of the most important service outcomes: customer satisfaction (Moshavi 2006). A *service encounter* consists of a series of interactions between a customer and a CS employee with the goal of addressing customer service requests and attaining customer satisfaction (Bitner et al. 1990). In this research, *customer satisfaction* refers to a customer's satisfaction with the service obtained from a specific service encounter (Bitner and Hubbert 1994; Oliver 1997).[3]

Expectation-confirmation theory (ECT) is one of the most representative lenses for explaining customer satisfaction (Anderson and Sullivan 1993; Oliver 1980). According to ECT, customers evaluate the performance of a service they receive vis-à-vis their expectations and determine the extent to which their expectations are confirmed. Empirical studies have offered consistent evidence that customer expectation confirmation is perhaps the best predictor of customer satisfaction (e.g., Anderson and Sullivan 1993; Kim et al. 2009; Szymanski and Henard 2001). *Customer expectation confirmation* refers to the extent to which a CS employee's service performance in a service encounter meets or exceeds the customer's expectations,[4] while

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[3] An alternative view of customer satisfaction is customers' cumulative satisfaction with a company's overall product/service offerings. We do not use this alternative view because our focus is on service encounters between CS employees and customers.

[4] ECT states that consumers form initial expectations and perceptions about a service and its performance. A lack of discrepancy between the expectation and perceived performance reflects the extent to which the expectation is confirmed, and such expectation confirmation determines consumers' satisfaction with the service. To measure the construct of expectation confirmation, prior literature has taken either a difference score approach or a non-difference score approach (see a review by Robinson 1999). The difference score approach subtracts respondents' expectation ratings from their performance ratings to understand the dynamics through which confirmation arises. In contrast, the non-difference score approach focuses on the level of confirmation and thus asks respondents to directly compare their perceptions to their expectations. We adopt the non-difference score approach since we focus on the level of confirmation rather than the dynamics through which the confirmation emerges.

customer satisfaction refers to a customer's evaluative attitudes regarding the CS employee's service in a service encounter (Anderson and Sullivan 1993; Oliver 1980).

## 2.4 Focus on Constructs at the Employee Job Level

Before developing our baseline model with the constructs described above, we clarify that the constructs in our model are at the *employee job level*. While *service encounter* refers to an interaction between a specific employee–customer pair for a service task, our focus is on system use and outcomes associated with an employee's service work, which are cumulative across service encounters for the employee. Corresponding to this focus, we conceptualize (1) an employee's assessment of his or her patterns of system use to accomplish his or her job, which develops from the use of the system across service encounters (Bitner and Hubbert 1994; Boulding et al. 1993), and (2) customer outcomes associated with the employee's service work.

We conceptualize an employee's infusion use of a CRM system as the employee's experience in using the CRM system to its fullest potential to accomplish his or her job in the best possible manner. The employee's experience with the use of the CRM system at work accumulates across his or her experiences of using the system in service encounters. It is also important to note that we are concerned with the employee's use of the system as a gestalt of features and not with the employee's use of individual system features or a selected combination of features. The employee may use different features to different extents and in different combinations across service encounters. Through these experiences, the employee develops an assessment of his or her use of the system to accomplish his or her job. Our conceptualization of infusion use of the system at the employee job level, which emerges from the employee's use of features across service encounters, corresponds to the compilational bottom-up emergence of multi-level phenomena (Zhang and Gable 2017).

In the same vein, we conceptualize the other constructs in our research model (i.e., CS employee user satisfaction, customer expectation confirmation, and customer satisfaction) at the employee job level. These constructs have the same meaning for employees who work in face-to-face and virtual channels. We next develop a baseline model of the mechanisms through which employee's infusion use affects customer outcomes and then build on it to theorize differences in the strengths of these mechanisms across face-to-face and virtual channels.

2.5 Baseline Model

Synthesizing the concept of infusion use (as described in section 2.2) and the IS success framework (as described in section 2.3) for the CRM-enabled service encounter context and then theorizing the investigated constructs at the employee job level (as described in section 2.4), we develop the baseline model shown in Figure 1, in which CS employees' infusion use of CRM systems affects customer expectation confirmation both *directly* ("a" in Figure 1) and *indirectly* through CS employees' satisfaction with the CRM system ("b" ✕ "c" in Figure 1). As theorized below, the rationale underlying the direct path is an "information content effect", and the rationale underlying the indirect path is a "heightened morale effect" associated with employee satisfaction.

Figure 1. Baseline Model
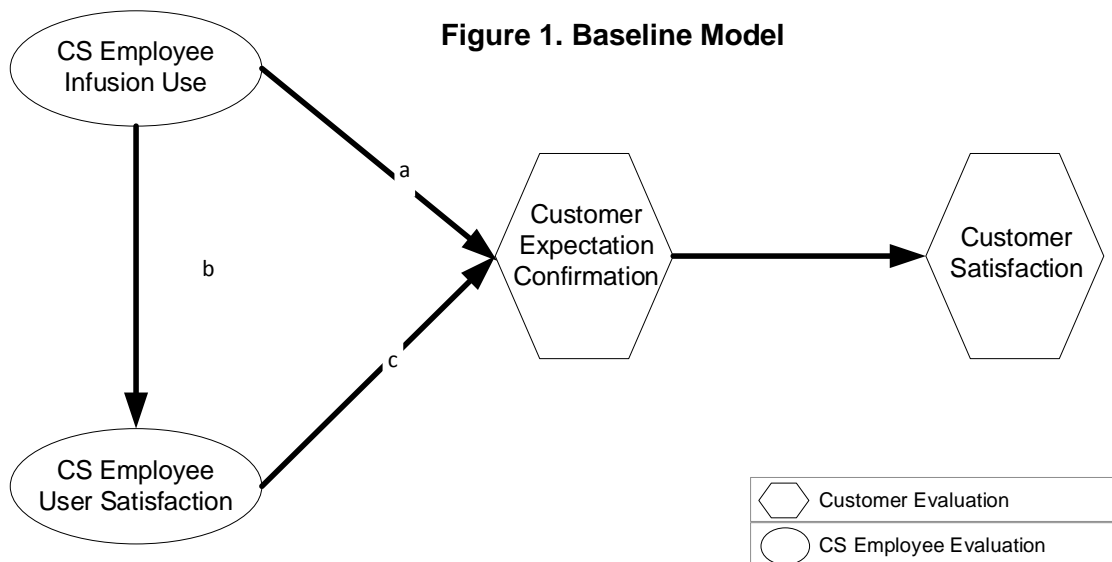
First, infusion use by CS employees can directly influence customer expectation confirmation because the *content* of information obtained from CRM systems supports CS employees' tasks in service encounters, and the enhanced service directly meets customers' expectations. The primary output of CRM systems, like that of other systems, is information. By engaging in infusion use of a CRM system, CS employees maximize the likelihood that they conduct precise and comprehensive searches, and retrieve timely, accurate, reliable, and complete information that matches customers' requests (Jones et al. 2002; Schwarz 2003; Sundaram et al. 2007). The high quality of information that CS employees obtain from CRM systems positions them to effectively address customers' requests and allows customers to confirm their service expectations (Au et al. 2008). In this study, we refer to this direct effect from employee infusion use to customer expectation confirmation as the "information content effect".

Second, infusion use can indirectly influence customer expectation confirmation via its effect on CS employee satisfaction. This indirect effect indicates that the fulfillment of CS employees' *work needs* by CRM-generated information through infusion use affects *how* the employees interact with customers in service encounters. Infusion use of CRM systems fulfills CS employees' need to accomplish their jobs and allows them to develop their own appraisals of the information support provided by the CRM systems. Recognizing the value of such support, employees may feel that their job needs are fulfilled in the working environment. Such feelings lead to higher employee satisfaction with the system (i.e., CS employee user satisfaction) (Au et al. 2008; DeLone and McLean 2003). In turn, employees who are satisfied with the CRM system have a heightened morale (Straub et al. 1995) and are more likely to actively engage in interactions and communications with customers that go beyond the minimum job requirements (Yoon and Suh 2003). Through such customer-oriented interactions and communications,

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employees will not only be able to understand customers' requests but will also proactively work with customers to explore the best solutions, a service process that is likely to exceed customer expectations (Rafaeli et al. 2008). We refer to this indirect effect from infusion use to customer expectation confirmation through employee user satisfaction as the "heighted morale effect".

Finally, according to the expectation-confirmation literature, customer expectation confirmation increases customer satisfaction (e.g., Anderson and Sullivan 1993; Kim et al. 2009; Szymanski and Henard 2001). Customers assess the extent to which their service expectations are fulfilled through the service delivery process, and their cognitive appraisal of the expectation confirmation results in customer satisfaction.

2.6 Differentiating between Face-to-Face and Virtual Channels

During service encounters, CS employees and customers can experience uncertainty (e.g., a lack of information about the root cause of a problem or about the solution to the problem) and ambiguity (e.g., conflicting interpretations of situations by customers and CS employees) (e.g., Chan et al. 2010; Gwinner at al. 2005). As the success of service encounters hinges on effectively addressing such uncertainty and ambiguity (Chan et al. 2010), the channels in which service encounters occur can play important—and different—roles in this regard. In particular, we focus on how the service channels affect the strength of the mechanisms through which successful service outcomes are achieved.

Channels for service encounters (or service channels) are the media through which customers and CS employees interact in service encounters (Neslin et al. 2006). In face-to-face service encounters, the participants are co-located and interact in person. In contrast, in virtual encounters, they are in different locations and interact remotely. Our study's focus is on how, once a customer chooses a service channel (either a face-to-face channel or a virtual channel), a

CS employee's infusion use of a CRM system affects customer satisfaction with the service encounter.[5] We submit that the media capabilities of face-to-face and virtual channels (in addressing uncertainty and ambiguity) affect the mechanisms through which CS employees' infusion use affects customer satisfaction. We choose media richness theory (MRT) (Daft and Lengel 1986), the closely related social presence theory (SPT) (Short et al. 1976), and communication accommodation theory (CAT) (Giles 2007; Street and Giles 1982) as our main theoretical lenses for differentiating between the media capabilities and communication patterns of face-to-face and virtual service channels (summarized in Table 1).

Table 1: Comparison of the RS and CC Channels in Service Encounters

	RS Channel	CC Channel
Richness of information cues transmitted during the service encounter	Rich information cues, including spoken words, facial expressions, body language, emotions, gestures, and other non-verbal cues	Less rich informational cues that exclude facial expressions, body language, gestures, and other non-verbal cues
Nature of communication in service encounters	Cohesive and personal communication patterns	Focused and purposeful communication patterns
Role of CRM in employee–customer interactions	The CRM system is relatively less important for CS employees in RSs (than for those in CCs) because it is *one* of the tools for supporting interactions between the employee and the customer	The CRM system is relatively more important for CS employees in CCs (than for those in RSs) because it is the *only* tool for supporting interactions between the employee and the customer

MRT differentiates different types of media based on their capabilities to address uncertainty and ambiguity during communication (Daft and Lengel 1986). To reduce uncertainty and ambiguity, the key is to use media with a capability to process rich information. *Richness of information cues* refers to the ability of information cues to change understandings in a timely manner (Daft and Lengel 1986). MRT considers media with high capabilities to (1) convey

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[5] Our focus is on customers choosing a particular service channel (i.e., media) on a transactional basis. Some studies have looked into the use of multiple service channels (i.e., media), either sequentially (e.g., Ba et al. 2010; Scherer et al. 2015) or simultaneously (e.g., Dennis et al. 2008), but that is not our focus in this study.

information cues (e. g., text, spoken words, tone of voice, facial expression, emotions, gestures, body language, dress, non-verbal cues), (2) provide immediate feedback, (3) allow for personalization, and (4) express content in natural language to be *rich media*, as these capabilities enable the transfer of rich information cues in order to overcome different frames of reference or clarify ambiguous issues to change understandings in a timely manner. Closely related to MRT, SPT suggests that the more a medium supports these four capabilities (e.g., the richer the information cues), the more likely participants will feel that the other parties are socially present (Short et al. 1976), which is especially important for interpersonal tasks such as CS employee– customer service encounters (Straub 1994). From the lenses of MRT and SPT, RSs and CCs are similar in their capabilities to provide immediate feedback, allow for personalization, and express content in natural language. However, these two service channels differ in their capabilities to (1) convey information cues and (2) create social presence. Admittedly, RSs permit the exchange of the full range of information cues, while CCs only allow for the exchange of voice- or text-based content (e.g., phone, instant messaging, web chat). Given this difference in the information cues that can be conveyed, RSs enable higher social presence during service encounters than do CCs.

CAT explains the different communicative behaviors people enact during social interactions in different media environments. As a theory that links communication and context, CAT argues that people adjust their speech, vocal patterns, and gestures to accommodate others depending on the environment in which the social interactions occur. Unlike face-to-face communication, which enables the exchange of a rich variety of information cues, the less sensory-filled communication in CCs relies more on the exchange of intelligence that is text- or voice-based (Barker and Gaut 1996; Daft and Lengel 1984). As a result, different communication patterns and discourse management strategies characterize the RS and CC

channels. While face-to-face communications (such as RSs) are more cohesive and personal, technology-mediated communications (such as CCs) are more task-oriented with clearer role expectations (Jonassen and Kwon 2001; Warkentin et al. 1997). People in virtual channels tend to eliminate elaborations and repetitions in order to increase the efficiency of communication (Jonassen and Kwon 2001). In other words, the lack of social cues makes CCs a more focused environment.[6] In such an environment, employees tend to deliver condensed yet purposeful information, and customers are also more likely to concentrate their attention and be more sensitive to the information that is communicated.

Figure 2. Research Model and Hypotheses
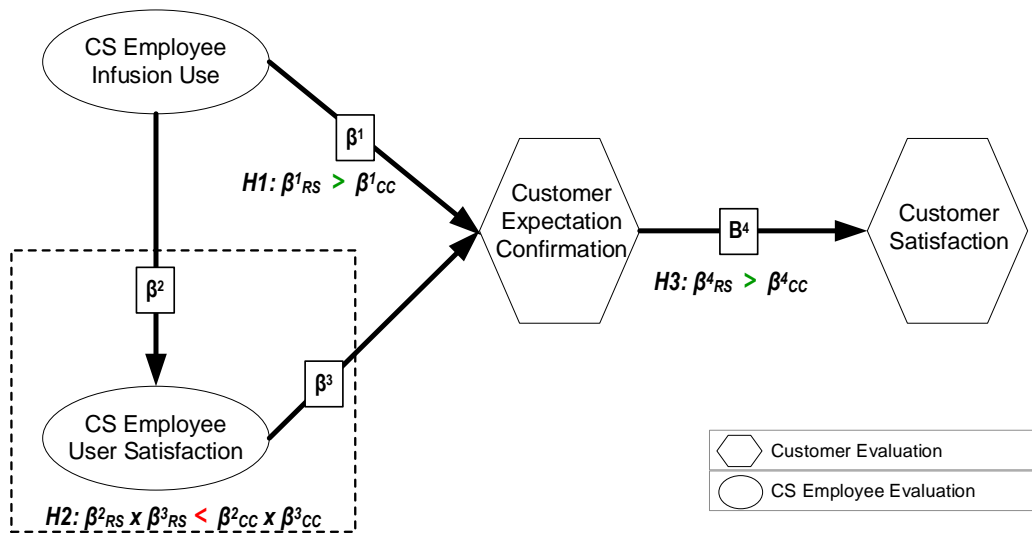
In short, there are important differences between face-to-face and virtual service channels, in terms of the media capabilities and communicative patterns to support service encounters between CS employees and customers. Based on these differences and the baseline model (Figure 1), we develop our research model and hypotheses (Figure 2) to explain the mechanisms through which CS employees' infusion use of CRM systems affects customer satisfaction during

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[6] We acknowledge that there can be background noise in both CC and RS environments. However, the existence of background noise does not weaken our argument that CCs facilitate a more focused communication environment than do RSs, because the background noise is a factor common in both settings.

service encounters and how the strengths of these relationships may differ between RSs and CCs.

3. Hypotheses

H1: Direct Effect of Infusion Use on Customer Expectation Confirmation

Infusion use, as defined earlier, reflects CS employees' self-assessments regarding applying CRM systems to the fullest extent to support their work in the best possible fashion. With infusion use of a CRM system, CS employees extract the information that is needed to respond to customer needs and align their services to fulfill customers' requirements (Jones et al. 2002; Schwarz 2003; Sundaram et al. 2007). Since no system operates in a vacuum, scholars have stressed the importance of considering the environment in which a system is utilized (e.g., Bostrom et al. 2009; DeSanctis and Poole 1994; Niederman et al. 2008; Orlikowski 1992; Schmitz et al. 2016). Following this line of thinking, we expect that the utility of infusion use is contingent upon the structural environment in which the CRM system is used.

In particular, we view the richness of the transmitted information as the key structural difference between the RS and CC channels. Compared to CCs, RSs are characterized by rich information cues. Studies have shown that, compared to voice- and text-based cues, non-verbal cues such as body language and facial expressions can better reflect and convey one's true feelings (Ekman and Friesen 2015; Segerstråle and Molnár1997). In the context of service encounters, customers in RSs can use more diverse and richer information cues than customers in CCs to better convey their inquiries and expectations to CS employees (Froehle 2006).

The rich information cues from customers in RSs give employees in this channel an information advantage over their counterparts in CCs in terms of understanding and responding to customer needs. During service encounters, employees in both channels can leverage the information retrieved through their infusion use of the CRM system (Bolton and Tarasi 2006).

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Importantly, in addition to CRM-generated information, employees also continuously seek information cues from their work environments, such as information cues from their customers (Hwang et al. 2015). The more relevant and critical the information cues that employees gather from customers, the more likely they can understand and thus meet customer needs (Hwang et al. 2015). Following the preceding discussion of channel differences, employees in RSs can potentially collect richer information cues on customer needs than their counterparts in CCs.

Such an information advantage in RSs relative to CCs will result in differential impacts of infusion use on customer expectation confirmation. If employees in RSs and CCs have the same level of infusion use of a CRM system, the richness of the information cues transmitted in RSs can complement the effect of the infusion use. Specifically, the richer information cues transmitted in RS channels allow employees in RSs to augment the information retrieved from the CRM system, which in turn allows them to better adapt their interactions with customers, personalize their solutions, and eventually meet customer expectations. In short, the richness of information cues transmitted in RSs (relative to CCs) amplifies the utility of the information retrieved through infusion use of the CRM system and strengthens the effect of employee infusion use on customer expectation confirmation. Accordingly, we propose:

> *Hypothesis 1 (H1): CS employees' infusion use of CRM systems has a stronger effect on customer expectation confirmation in retail stores than in contact centers.*

H2: Indirect Effect of Infusion Use via CS Employee User Satisfaction

When developing the baseline model (Figure 1), we argued that employees' infusion use of a CRM system generates instrumental information for fulfilling their work needs, which stimulates their satisfaction with the system, and employee satisfaction with the system in turn enhances their morale for engaging in customer-oriented communications that facilitate better service that meets or even exceeds customer expectations (Rafaeli et al. 2008; Straub et al. 1995;

Yoon and Suh 2003). We call this indirect effect of the infusion use of CRM systems on customer expectation confirmation via user satisfaction the *heightened morale effect*. Considering the differential media capabilities between virtual and face-to-face channels (section 2.6), we expect this indirect effect to be stronger in CCs than in RSs for the two reasons below.

First, as discussed above, communication style is a key constitutive element characterizing the heightened morale effect. When interacting in an environment that is more restricted in information cues and social presence, people tend to adapt their communication style to place a greater emphasis on task-oriented conversation and less on personal and socio-emotional interactions, thereby directing their attention and effort toward solving the problems at hand (De Ruyter and Wetzels 2000). As virtual channels (e.g., CCs) permit fewer information cues and less social presence than face-to-face channels (Jonassen and Kwon 2001), the communication style is more focused and purposeful (Condon and Cech 1996; Warkentin et al. 1997). In this case, CS employees who are satisfied with their CRM systems (and thus heightened in morale) will devote more attention and effort to responding to customer inquiries and therefore better meet customer expectations. In contrast, the communication style in a face-to-face channel (e.g., RSs) may be less focused and easier to distract. For example, unlike CS employees in CCs, who typically work in small and restricted cubicles dedicated to communicating with customers, employees in RSs usually work in a more open environment. As such, an ongoing communication between an employee and a customer in an RS can be easily interrupted by other customers or employees who have pressing requests. A CS employee in an RS is therefore more likely to be distracted from addressing what the customer wants and, as a result, devote less attention and effort to meeting customer expectations. To recap, because of the differential media capabilities between virtual and face-to-face channels, the communication style characterizing

the heighted morale effect could be more focused and purposeful in CCs than in RSs in terms of addressing customer inquiries and hence meeting customer expectations—in other words, the heightened morale effect will be stronger in CCs than in RSs.

Second, the CRM system is relatively more important for employees' communication with customers in CCs than in RSs. Specifically, given the aforementioned limitation in virtual environments' media capabilities, the CRM system is the only tool that CS employees in CCs can leverage to exchange text- or voice-based intelligence and enact solutions (Barker and Gaut 1996). When dissatisfied with CRM systems that fail to support their service activities, employees in CCs lack alternative approaches/tools to cope with the CRM system's limitations and are more likely to fall short with respect to customer expectations. Thus, in CCs, the extent to which customer expectations can be met by CS employees will be very sensitive to the employees' satisfaction with the CRM systems. In contrast, CS employees in RSs can use alternative approaches other than CRM systems—such as physical objects and techniques (e.g., sample products, leaflets, brochures, and other materials)—to compensate for system limitations and effectively interact with customers. Thus, even if employees in RSs are not satisfied with CRM systems that fail to adequately support their work needs, the availability of alternative tools and techniques can still help them meet customer expectations. In this case, it is also easier for employees in RSs to leverage their social presence and deliver a sense of interpersonal care, warmth, and friendship—which are limited in CCs—to help address customer requests and recover from ineffective service (Berry et al. 1988; Zeithaml et al. 1996). Hence, the ability of employees in RSs (CCs) to serve customer needs and meet customer expectations is less (more) sensitive to their satisfaction with their CRM systems. The preceding discussion therefore suggests that the relative importance of CRM systems for employees in communicating with

customers differs between CCs and RSs because of the differential media capabilities of the two channels, and as a result, the heightened morale effect (that is, through user satisfaction) will be stronger (weaker) in CCs (RSs). The two above reasons lead to our second hypothesis:

> *Hypothesis 2 (H2): The indirect effect of CS employee infusion use of CRM systems on customer expectation confirmation via CS employee user satisfaction is stronger in contact centers than in retail stores.*

H3: Link from Customer Expectation Confirmation to Customer Satisfaction

As mentioned above, the expectation-confirmation literature has long supported a positive link between customer expectation confirmation and customer satisfaction. Recent research in this stream has considered the notion of "certainty of attitudes" (Homburg et al. 2006) and has examined how it may moderate the link from customer expectation confirmation to customer satisfaction. The link represents customers' attitude formation (i.e., satisfaction) as a result of performance evaluations (i.e., expectation confirmation). Customer evaluations are associated with varying degrees of certainty (Eagly and Chaiken 1993; Smith and Swinyard 1983), and customers' evaluations of service performance are based on information cues relevant to that service (Anderson and Sullivan 1993). With more relevant information cues, customers are more certain about their evaluations (Chandrashekaran et al. 2000; Suh and Lee 2005).

RSs offer a rich set of information cues for customers to evaluate CS employees' service. While customers in CCs only receive information cues via phone- or text-based communications, customers in RSs experience the full range of information cues from CS employees. Additionally, customers in RSs may have the option to choose and interact with a preferred CS employee if that individual is on duty. In CCs, however, customers are generally automatically assigned to CS employees (Durr 2009; Ford 2011), and they usually lose contact after a service is provided (Froehle 2006). This precludes the opportunity to develop cumulative mutual understanding,

which has been shown to provide customers with additional information cues for evaluating CS employees' service performance (Hu and Hui 2012; Sarker et al. 2010).

In sum, customers have a richer set of information cues to evaluate CS employee service in RSs than in CCs. As a result, customers' evaluations and the resulting expectation confirmation are likely to be more certain in RSs than in CCs (Chandrashekaran et al. 2000; Suh and Lee 2005). With this greater certainty, customer expectation confirmation should play a stronger role in affecting customer satisfaction in RSs than in CCs (Homburg et al. 2006). Thus, we propose:

> *Hypothesis 3 (H3): Customer expectation confirmation has a stronger effect on customer satisfaction in retail stores than in contact centers.*

4. Empirics

4.1. Research Design

To test our hypotheses, we conducted a field study and collected multi-wave and multi-source data from CS employees, customers, and firm archives.

Research Site

The investigative site is a large telecom company, a global Fortune 500 firm, and one of the major mobile phone service providers in China. The CRM system implemented in the company is called Business and Operations Support System (BOSS), a standard system that is widely used by telecommunication service providers across the globe (Amdocs Annual Report 2017; Bushaus 2014; Terplan 2001; Transparency Market Research Report 2016). The fundamental purpose of BOSS is to support various end-to-end telecommunication services for customers. To this end, BOSS provides four core functions in the target firm, similar to its use in other leading telecom service providers such as AT&T, Verizon, and T-Mobile (Amdocs Annual Report 2017; Bushaus 2014): (1) customer management that supports customer interactions via multiple touch points, (2) product management that offers information about products (e.g., rate plans, service bundles,

service subscriptions), (3) order management that tracks order details (e.g., SIM card activation, service subscription, service cancellation), and (4) revenue management that generates billing and payment information. These functions[7] collectively enable CS employees to process basic transactions, offer customized recommendations that match individual consumer preferences, and identify and capture cross-selling and up-selling opportunities. While there might be some channel-specific features in BOSS given the nature of telecommunication services, its core functions are highly standardized and comparable across the RS and CC channels.

Regarding the service procedure, CS employees in both channels are required to use the CRM system in each service encounter. While speaking to customers face-to-face or via telephone, employees must use the CRM system to verify customers' identity at the beginning of each service encounter and to continually extract or record different types of information during their interactions with customers (e.g., the customer profile, order information, or service record), depending on the purpose of each inquiry and the evolution of each interaction.

By the time we began data collection, the firm had implemented the BOSS system as well as standardized service processes across all provinces (states) in China. To manage the scope of our research, we chose to conduct this study in one typical province where the firm had successfully installed and used the system in both channels for about one and a half years. The system had stabilized and was being used by CS employees as a routine part of their everyday work, making it an appropriate research site for investigating the infusion use that follows routinization (Cooper and Zmud 1990; Saga and Zmud 1994).

Finally, while increasingly more service firms are offering service through multiple

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[7] The four core functions have been verified and are consistent with the features identified in prior literature (e.g., Feinberg and Kadam 2002).

channels, it is a typical industrial practice for service firms to hire CS employees to work in *either* RSs *or* in CCs at a given time. CS experts who work simultaneously in both RSs and CCs are usually managers who need to oversee activities in both channels. We focus on CS employees who work in only one service channel (either a RS or CC), rather than the managers who supervise both. The research site also confirmed that it is their practice to deploy each CS employee in only one service channel at a given time.

Measures

Appendix A provides the survey measures, most of which we adapted to our context from existing scales. Prior literature has operationalized IS use employing either objective measures (e.g., system logs) or subjective measures (e.g., self-reported use). We operationalized infusion use by self-assessment, that is, infusion use as perceived by CS employees. In general, whether a behavior counts as infusion use depends on the user's perspective, as individuals resort to their own cognitive frameworks as the reference points for making sense of their behaviors (Dukerich et al. 2002; Weick et al. 2005). The specific service tasks that CS employees handle may vary across time and locations, so it is appropriate to ask CS employees to use their own reference points to evaluate the degree to which they use the CRM system to support their service tasks. CS employees have firsthand experience and the most direct information for making such evaluations. We thus focused on the CS employee as our unit of analysis and chose to measure perceived infusion use at the level of individual employees.

For *CS employee user satisfaction*, we adapted three seven-point semantic differential scales from Bhattacherjee (2001) and Au et al. (2008). For *infusion use*, we adapted three seven-point Likert scales, ranging from "strongly disagree" (1) to "strongly agree" (7), from Jones et al. (2002), Schwarz (2003), and Sundaram et al. (2007).

Scholars argue that customer satisfaction and expectation confirmation can be conceptualized as either transaction-specific or cumulative. Consider, for example, customer satisfaction. While cumulative satisfaction represents customers' overall assessment of their accumulated experience with a firm, transaction-specific satisfaction refers to customers' evaluation of a specific service encounter (Boulding et al. 1993). Given our emphasis on the effectiveness of CRM systems for CS employees' service encounters with customers, we focused on transaction-specific customer satisfaction and expectation confirmation. Specifically, to measure *customer expectation confirmation*, we adapted a single-item,[8] five-point scale anchored at the middle and endpoints ("much worse than expected" / "as expected" / "much better than expected") from Smith et al. (1999). Turning to customer satisfaction, although many have measured this construct with only one item (e.g., Cronin et al. 2000; Froehle 2006; Srinivasan and Moorman 2005), we followed the two-item approach used by Bitner and Hubbert (1994). The first item asked customers about the extent to which they were satisfied with the service offered by a specific employee at a specific date and time using a 0–100% ratio scale ranging from "not at all satisfied" (0%) to "completely satisfied" (100%). The second item, adapted from Smith et al. (1999), asked customers to rate their satisfaction with the service provided by a specific employee at a specific date and time on a 10-point Likert scale ranging from "very dissatisfied" (1) to "very satisfied" (10). These two different scale formats for customer satisfaction helped minimize the potential threat of common method bias derived from a

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[8] Based on the feedback from customers in our pilot study and following recommendations regarding the use of single-item measures (Bergkvist and Rossiter 2007; Fuchs and Diamantopoulos 2009), we adopted a single-item measure for customer expectation confirmation, as the measure is concrete in the minds of respondents and is easily and uniformly understood. In this situation, a single-item measure represents predictive validity equal to that of a multi-item measure (Bergkvist and Rossiter 2007) and is considered appropriate for this study. In addition, to reflect the measurement error in customer expectation confirmation, which cannot be estimated with a single-item measure, we conducted a sensitivity analysis by varying the reliability of the single-item measure of customer expectation confirmation from 0.7 to 1.0, and the results remained largely consistent.

common scale (Podsakoff et al. 2003; Sharma et al. 2009). When conducting our analyses, we multiplied the first item by 9 and added 1 to compensate for the scale difference between the two items. As a result, the transformed score, like the second item's scale, also ranged from 1 to 10.

We hired two certified professional translators to independently translate and back-translate the questionnaire between English and Chinese (Brislin et al. 1970; Chidlow et al. 2014). The questionnaires in Chinese were then distributed to thirty-five randomly selected CS employees as part of a pilot study to preliminarily examine construct validity and reliability. We also pilot tested customer-related measures through telephone interviews with thirty randomly selected customers. These pilot tests offered preliminary evidence of acceptable construct validity and reliability. Some minor modifications in wording were made based on feedback from the CS employees and customers before we conducted the official large-scale data collection.

Controlling for Channel/Store Heterogeneities in Service Tasks and Customer Needs and Preferences

Given our purpose of comparing mechanisms for CRM system success across RSs and CCs, we needed to control for possible heterogeneities in service tasks and customer needs and preferences across channels. This is an important step because such heterogeneities, if present, can affect employee satisfaction with the CRM system and customer satisfaction in a specific channel. Today, most services offered through RSs and CCs are comparable in many industries. In the telecom service industry, for example, firms offer most, if not all, of their services through both channels. This was also true at our research site. In addition, we confirmed that the tasks conducted when offering services through each channel at the research site were comparable.

Still, we could not completely rule out the possibility that customers might select particular service channels depending on their particular needs and preferences. Because some needs can

be more easily satisfied than others (as the associated tasks can be performed more easily), it is reasonable to expect the average level of customer satisfaction to vary across channels (Simester et al. 2000). In addition, prior research has found heterogeneity in customer satisfaction across geographical regions (Mittal et al. 2004). While customers in the CC channel are not constrained by geographical regions, RSs typically serve local customers. Hence, we needed to control for possible channel/store heterogeneities in customer satisfaction.

Following prior literature, we developed controls to account for heterogeneities in service tasks and customer needs and preferences across channels and stores. Specifically, we used our survey data to compute the average customer expectation confirmation and average customer satisfaction for each employee in the CC and the RS (Simester et al. 2000). These averages served to capture the unobserved channel/store heterogeneities, such as customer preferences in channel/store selection (Simester et al. 2000). It is also worth noting that there was a time lag between our data collection for these controls and our measurement of the dependent variables.

Control Variables

In addition to the controls for the heterogeneity of service tasks and the heterogeneity of customer needs and preferences across channels, the structural model controlled for CS employee characteristics. Prior research on IS use and benefits (e.g., Agarwal and Prasad 1999; Thompson et al. 1994; Venkatesh et al. 2002) has controlled for users' demographic characteristics, and following the literature, we controlled for CS employees' gender (1 = male, 0 = female), education (1 = elementary or below, 2 = junior high, 3 = senior high, 4 = college, 5 = bachelor's degree or above), age, prior system use experience (number of months using CRM systems), prior service experience (number of months working as a CS employee), and the service channel in which they worked (RS or CC). To evaluate the effect of quantity aspects of

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IS use such as IS use time (e.g., Burton-Jones and Straub 2006) above and beyond the influence of infusion use, we also asked the employees to report the percentage of their work time in which they used the CRM system on a 0–100% ratio scale. Finally, we controlled for the CS employees' overall work performance, because it can serve as a proxy for employees' overall work capabilities and thus affect customer satisfaction (Liao and Chuang 2004). The firm evaluated the CS employees' prior work performance on a 100-point scale in the year *before* our study. We obtained information for these controls from the firm's archives.

We also controlled for customer profiles. Customers of different ages (Moschis 2003) and genders (Hsu 2001) may prefer different channels. Prior literature also suggests that customer responses to service encounters may vary by gender (Fischer et al. 1997) and age (Homburg and Giering 2001). To control for the effect of customer profile heterogeneity, we computed average customer gender and age for each CS employee based on the profiles of the sampled customers.[9]

Data Collection Procedure

We collected data from three sources: CS employees, customers, and archives. First, we collected data from CS employees regarding infusion use and CS employee user satisfaction. We randomly sampled 300 CS employees working in RSs and 300 CS employees working in the CC for the selected province. Second, we collected data from customers regarding customer expectation confirmation and customer satisfaction. We asked the firm to randomly sample at least seven customers for each CS employee. At the time of our data collection, the firm selected

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[9] We recognize that the customer's experience with different channels may affect customer satisfaction with a certain service encounter. We took steps to control for this effect through our research design. First, in our empirical setting, the call routing system is designed to allocate customer calls to CS employees based on CS employees' availability rather than customers' experience. As such, there is no systematic bias that one employee is assigned only highly experienced customers and another employee is assigned only customers with limited experience. Second, we aggregated customer responses for each CS employee. The aggregation helps average out customers' variation in channel experiences, thus controlling for the effect of customers' channel experiences.

customers whom the CS employee had just served and called these customers back within a week to obtain information about their customer expectation confirmation and customer satisfaction regarding their service encounters with the corresponding CS employee. For each CS employee , we used the *average* of the seven customer responses as the score for each measurement item for customer expectation confirmation and customer satisfaction. [10] This approach helped average out possible noise in individual customer evaluations. Because this type of data collection demands significant time and effort, the firm's decision to obtain responses from seven customers for each CS employee was the result of resource considerations. Third, we used firm archives to obtain information about customer and CS employee characteristics.

The data collection consisted of multiple steps. At T0, we collected data for the control variables for CS employees. At T1 (one month after T0), we collected data for CS employee user satisfaction and infusion use. Finally, at T2 (one month after T1), we collected data for customer expectation confirmation and customer satisfaction, as well as the control variables for customers (i.e., customer age and gender).

Throughout the entire data collection process, we encouraged CS employee responses and ensured data confidentiality by explicitly emphasizing that we coded subjects' identity in such a way that only the research team could match data from different sources and across different time points, and that no one in the company could identify the subjects. We also assured the CS employees that we would only present aggregate statistics. During the data collection process, some of the surveyed CS employees experienced promotions, functional changes, or transfers to different stores. We retained a subject for analysis only if he or she remained in the same RS/CC as a CS employee throughout the entire data collection process in order to control for potential

[10] The overall inter-rater reliability among customer responses for each CS employee was 0.82, suggesting substantial agreement among customer evaluations (James et al. 1984).

confounds due to changes in the working environment. This left us with 196 CS employees in the RS channel and 195 CS employees in the CC channel for empirical analysis.

Sample Demographics

Table 2 reports the sample demographics. In both channels, there were more females than males and more employees without a bachelor's degree than with one. This sample profile corresponds closely to the demographic characteristics reported in industrial reports (e.g., Paton 2010; Service Canada 2012; United States Department of Labor 2010) and in research studies (e.g., Fischer et al. 1997; Wang et al. 2008) insofar as the majority of frontline CS employees in CCs and RSs are female and have education levels lower than a bachelor's degree.

Table 2: Sample Demographics

Category: CS Employees		Pooled Data, N = 391	Retail Store, N = 196	Contact Center, N = 195
		Distribution	Distribution	
Education	High School	31.5%	24.5%	38.5%
	College	59.6%	60.2%	58.9%
	Bachelor's Degree or Higher	9.0%	15.3%	2.6%
Gender	Male	14.8%	24.0%	5.6%
	Female	85.2%	76.0%	94.4%
		Mean (S.D.)	Mean (S.D.)	
Age (Years)		23.80 (2.64)	24.38 (1.94)	23.22 (3.09)
CRM System Use Experience (Months)		14.05 (4.45)	14.17 (4.29)	13.93 (4.61)
Service Experience (Months)		25.24 (14.08)	28.41 (14.94)	22.06 (12.39)
Prior Work Performance (0–100 Scale)		79.32 (12.97)	84.27 (10.89)	74.36 (14.7)
System Usage Time (0–100% Scale)		82.9% (17.6%)	83.5% (17.0%)	82.3% (18.3%)
Category: Customers		Pooled Data, N = 2,749	Retail Store, N = 1,372	Contact Center, N = 1,377
		Distribution	Distribution	
Gender	Male	43.3%	42.2%	44.5%
	Female	56.7%	57.2%	54.2%
		Mean (S.D.)	Mean (S.D.)	
Age (Years)		41.69 (10.5)	42.85 (10.11)	40.54 (9.97)

4.2. Results

Measurement Model

We conducted confirmatory factor analysis (CFA) using AMOS 20.0 to evaluate the measurement model. We estimated the measurement model separately for the two groups (i.e., RSs and CCs). The CFA results (Table 3) show reasonable model fit for both groups. We

assessed internal consistency and convergent validity by examining item loading. Table 4 shows that the item loadings are significant with a high magnitude. Table 5 shows that the composite reliabilities are all higher than 0.707 (Nunnally and Bernstein 1994) and that the values of the average variance extracted (AVE) are all above 0.50, confirming acceptable construct reliability (Fornell and Larcker 1981). Tables B1 and B2 (in Appendix B) show that for each pair of constructs, the absolute value of their correlation is less than the square root of each construct's AVE (Fornell and Larcker 1981). Discriminant validity was further examined by testing whether the correlations between pairs of constructs were significantly different from unity (Gefen et al. 2003). The chi-square of the unconstrained CFA is less than any possible union of any two constructs. The results of the two analyses jointly support discriminant validity.

Table 3: Fit Indices for the Measurement Model

Goodness of Fit Indices	Pooled Data	Retail Store	Contact Center	Desired Level
χ^2/DF	1.51	1.55	1.42	< 3
CFI	0.994	0.989	0.990	> 0.9
SRMR	0.0221	0.0285	0.0327	< 0.08
RMSEA	0.036	0.053	0.046	< 0.08
Bollen-Stein P	0.105	0.184	0.114	> 0.05

Table 4: Item–Factor Loading

ITEM	Pooled Data	Retail Store	Contact Center
CS Employee Infusion Use (Item_1)	0.89	0.91	0.87
CS Employee Infusion Use (Item_2)	0.86	0.87	0.85
CS Employee Infusion Use (Item_3)	0.84	0.84	0.81
CS Employee User Satisfaction (Item_1)	0.92	0.97	0.97
CS Employee User Satisfaction (Item_2)	0.94	0.94	0.95
CS Employee User Satisfaction (Item_3)	0.81	0.85	0.83
Customer Expectation Confirmation	1.00	1.00	1.00
Customer Satisfaction (Item_1)	0.85	0.85	0.80
Customer Satisfaction (Item_2)	0.81	0.81	0.80

Table 5: Descriptive Statistics and Reliability of Latent Constructs

| Construct	Pooled Data			Retail Store			Contact Center		
	Mean (SD)	Composite Reliability	AVE	Mean (SD)	Composite Reliability	AVE	Mean (SD)	Composite Reliability	AVE
CS Employee Infusion Use	4.73 (1.10)	0.90	0.75	4.99 (0.99)	0.91	0.76	4.47 (1.14)	0.88	0.71
CS Employee User Satisfaction	4.17 (1.10)	0.92	0.80	4.41 (1.10)	0.94	0.85	3.93 (1.05)	0.94	0.84
Customer Expectation Confirmation	3.50 (0.44)	NA	NA	3.41 (0.41)	NA	NA	3.59 (0.45)	NA	NA
Customer Satisfaction	4.17 (0.30)	0.82	0.69	4.06 (0.30)	0.82	0.69	4.28 (0.26)	0.78	0.64
Controls:									
Store Ave. Customer Expectation Confirmation	3.50 (0.16)	NA	NA	3.44 (0.21)	NA	NA	3.57 (0.01)	NA	NA
Store Ave. Customer Satisfaction	4.19 (0.14)	0.80	0.67	4.08 (0.14)	0.84	0.72	4.30 (0.01)	0.77	0.63
CS Employee Ave. Customer Gender	0.45 (0.12)	NA	NA	0.44 (0.12)	NA	NA	0.46 (0.12)	NA	NA
CS Employee Ave. Customer Age	40.55 (2.48)	NA	NA	42.63 (2.41)	NA	NA	40.48 (2.55)	NA	NA

Structural Model, Hypothesis Testing, and Results

Table 6 and Figure 3 show the results for the baseline model. Overall, the structural model fits the data well, based on the cutoff criteria suggested by Hair et al. (2006) (CFI = 0.988, RMSEA = 0.028, SRMR = 0.026). Among the control variables, customer age is negatively associated with customer satisfaction ($\beta = -0.03$, $p < 0.05$), the service channel is positively associated with customer expectation confirmation ($\beta = 0.13$, $p < 0.01$) and negatively with customer satisfaction ($\beta = -0.16$, $p < 0.01$), and CS employee gender ($\beta = -0.13$, $p < 0.05$) and prior working experience ($\beta = -0.15$, $p < 0.05$) are both negatively associated with customer expectation confirmation. All path coefficients in the model are significant with the expected direction. Specifically, infusion use has a significant direct effect ($\beta1 = 0.13$, $p < 0.10$) as well as an indirect effect via CS employee user satisfaction ($\beta2 = 0.48$, $p < 0.01$; $\beta3 = 0.12$, $p < 0.10$; $\beta2*\beta3 = 0.06$, $p < 0.05$) on customer expectation confirmation. Finally, customer expectation confirmation is positively associated with customer satisfaction ($\beta4 = 0.57$, $p < 0.01$).

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Goodness of Fit Indices	Pooled Data	Desired Level
χ^2/DF	1.300	< 5
TLI	0.977	> 0.9
CFI	0.988	> 0.9
SRMR	0.026	< 0.08
RMSEA	0.028	< 0.08
Bollen-Stein P	0.104	> 0.05

Figure 3. Results of the Structural Model (Pooled Data)
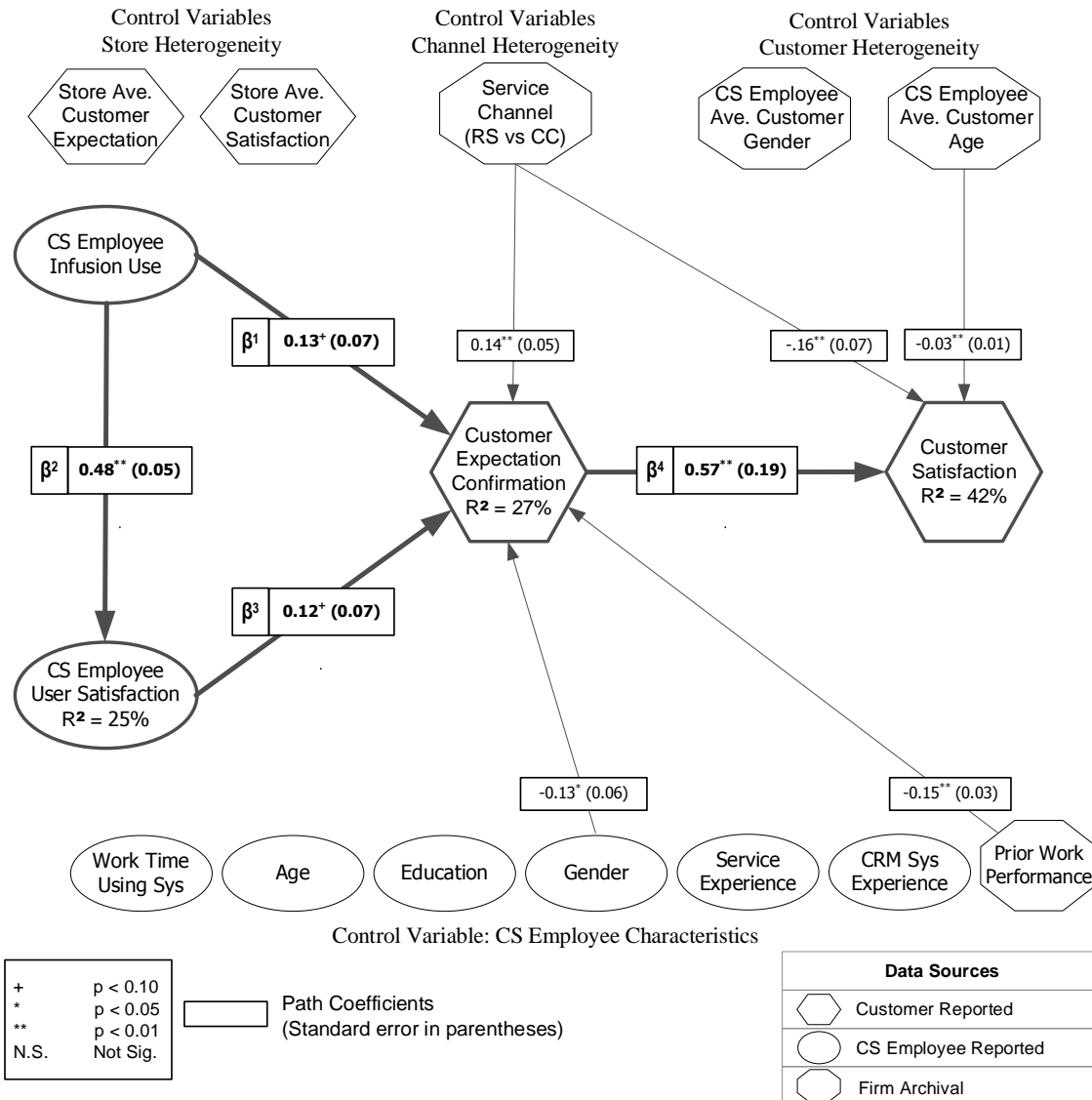
Note. The estimation of the structural model included four sets of controls: (1) CS employee characteristics, (2) customer profiles, (3) service channel, and (4) heterogeneities in service tasks and customers' needs and preferences across channels and stores.

Table 7: Structural Model Fit Indices by Channel

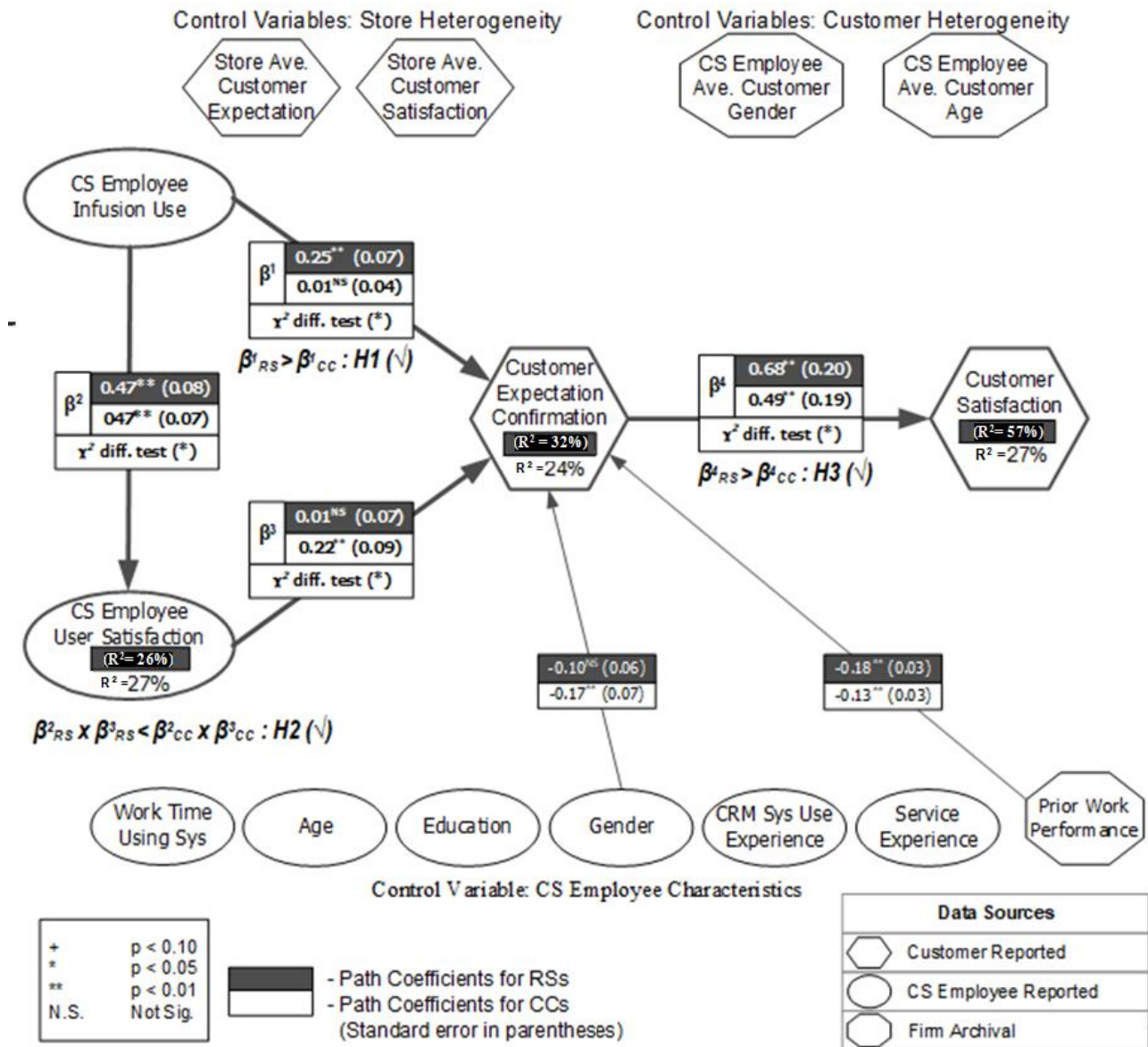| Goodness of Fit Indices	Retail Store	Contact Center	Desired Level
χ^2/DF	1.169	1.119	< 5
TLI	0.977	0.981	> 0.9
CFI	0.988	0.990	> 0.9
SRMR	0.0302	0.0385	< 0.08
RMSEA	0.029	0.025	< 0.08
Bollen-Stein P	0.328	0.408	> 0.05

Figure 4. Results of Structural Model Channel Comparison

Note. The estimation of the structural model included three sets of controls: (1) CS employee characteristics, (2) customer profiles, and (3) heterogeneities in service tasks and customers' needs and preferences across channels and stores.

Next, Table 7 and Figure 4 present our structural model results for the RS and CC channels. The results in Table 7 suggest good structural model fit for both channels. As shown in Figure 4, the structural model explains a significant amount of variance in the dependent variables in both RSs and CCs. Because we need to compare structural paths for the two channels, we conducted measurement invariance analyses (see Appendix C), and the results suggest that it is appropriate to compare path estimates across the two channels (RSs vs. CCs).

Results of Hypothesis Testing

Our results (Figure 4) show that infusion use of CRM systems significantly affects customer expectation confirmation in RSs ($\beta = 0.25$, $p < 0.01$), but not in CCs. A significant χ^2 test ($p < 0.05$) further suggests that the direct effect of infusion use on customer expectation confirmation is statistically higher in RSs than in CCs. These results ***support H1***. The non-significant relationship in CCs indicates that, although employees in CCs engage in infusion use, they may not be able to formulate the most effective customer solutions based on CRM-generated information as they are exposed to limited complementary information cues from customers. That is, the utility of the information retrieved through infusion use of the CRM systems is weakened, reducing the effect of infusion use on customer expectation confirmation.

Before testing H2, we examined whether the effect of infusion use on CS employee user satisfaction and the effect of CS employee user satisfaction on customer expectation confirmation are different across RSs and CCs. We found that infusion use has a similar effect on CS employee user satisfaction for RSs ($\beta = 0.47$, $p < 0.01$) and CCs ($\beta = 0.47$, $p < 0.01$), and the non-significant χ^2 test ($p > 0.05$) further suggests that the beta coefficient of this path does not differ significantly across channels. Next, we found that CS employee user satisfaction significantly influences customer expectation confirmation in CCs ($\beta = 0.22$, $p < 0.05$), but not in

RSs, and the results of the χ^2 test ($p < 0.05$) also suggest that the effect of CS employee user satisfaction on customer expectation confirmation is statistically stronger in CCs than in RSs.

Against this backdrop, we tested H2 and found that the indirect effect of infusion use on customer expectation confirmation via CS employee user satisfaction is not significant in RSs in that infusion use significantly influences CS employee user satisfaction ($\beta = 0.47$, $p < 0.01$), but CS employee user satisfaction does not significantly affect customer expectation confirmation. In contrast, in CCs, infusion use significantly affects CS employee user satisfaction ($\beta = 0.47$, $p < 0.01$), and CS employee user satisfaction also significantly influences customer expectation confirmation ($\beta = 0.22$, $p < 0.05$). Based on the results of both the Sobel (1982) test and the non-parametric bootstrapping test (Taylor et al. 2008), the indirect effect is statistically insignificant in RSs (0.47×0.01) but significant in CCs (0.47×0.22) at the $p < 0.05$ level (Appendix D provides details about the Sobel test and bootstrapping tests). The above evidence collectively *supports H2*, in which we predicted that the indirect effect of infusion use via CS employee user satisfaction is stronger in CCs than in RSs.

A possible explanation for the non-significant effect of employee user satisfaction on customer expectation confirmation in RSs is that CS employees in RSs may experience less focused communications in the open environment and be very likely to be distracted. Employees in RSs also have alternative tools besides the CRM for addressing customer requests, so that employees who are dissatisfied with the CRM may not necessarily fall short of customer expectations. It could be the presence of face-to-face interactions in the RS channel that diluted the effect of employee satisfaction with the CRM system on customer expectation confirmation.

Customer expectation confirmation affects customer satisfaction in both RSs ($\beta = 0.68$, $p < 0.01$) and CCs ($\beta = 0.49$, $p < 0.01$). A significant χ^2 test ($p < 0.01$) suggests that the effect is

stronger in RSs than in CCs. These results **support H3,** suggesting that customer expectation confirmation has stronger explanatory power (due to more information cues for service evaluations and thus higher certainty regarding expectation confirmation) in RSs than in CCs.

Following the bootstrapping approach of Taylor et al. (2008), we further assessed whether infusion use directly and/or indirectly affects customer satisfaction. The results suggest that infusion use *indirectly* affects customer satisfaction in both channels, albeit via different routes. In RSs, infusion use affects customer satisfaction through expectation confirmation, but in CCs, it does so through user satisfaction and then expectation confirmation. Our results are consistent with the expectation confirmation lens in that expectation confirmation is the key bridge of other factors to customer satisfaction (Szymanski and Henard 2001).

Control Variables

The results in Figure 4 also show the influence of some of the control variables. We found that female CS employees in CCs are more likely to have higher levels of customer expectation confirmation. This may be attributed to the fact that females tend to have higher tolerance and are generally better at interacting and building rapport with customers, which are favorable traits for successful service encounters in the CC context (Holmes and Meyerhoff 2008). In addition, CS employees' prior performance is negatively related to customer expectation confirmation. A possible explanation for this finding might be that employees who had better performance in the previous year were assigned more responsibilities (e.g., assisting in administrative functions, training) than those whose performance was not as good.

Endogeneity of Infusion Use

Our framework posits that infusion use is an antecedent of CS employee user satisfaction, while it could also be argued that CS employee user satisfaction may also stimulate infusion use.

It is also possible that some unobservable common factors may lead infusion use and employee user satisfaction to co-vary. We conducted the Garen test to safeguard against the potential endogeneity of infusion use. As reported in Appendix E, the results of this analysis suggest that our conclusions about the role of infusing use in explaining CS employee user satisfaction hold true after controlling for the endogeneity of infusion use.

5. Discussion

5.1 Implications for Research

We summarize the results and implications in Table 8 and discuss them below.

Table 8: Results and Implications

Model Path	Hypothesis	Hypothesis Supported?	Implications
CS Employee Infusion Use → Customer Expectation Confirmation	RS > CC (H1)	Yes	1: CS employee infusion use of CRM systems contributes to customer satisfaction.
CS Employee Infusion Use → CS Employee User Satisfaction → Customer Expectation Confirmation	RS < CC (H2)	Yes	2: CS employee infusion use of CRM systems leads to customer expectation confirmation through two different mechanisms. 3: The mechanisms underlying the success of CRM-enabled service encounters differ across face-to-face and virtual service channels.
Customer Expectation Confirmation → Customer Satisfaction	RS > CC (H3)	Yes	4. The benefits of CRM infusion use are multi-stakeholder in nature, impacting both internal CS employees (i.e., employee satisfaction with CRM systems) and external customers (i.e., customer satisfaction).

Importantly, today's business environment may allow employees to have great discretion over *how well*, as opposed to *how much*, an information system is used. As users of organizational systems, employees exhibit a wide variance regarding the technological functions they use and the way they use these functions to complete their tasks (Boudreau and Seligman 2005; De Sousa 2005; Jasperson et al. 2005; Hsieh and Zmud 2006). Given this situation, researchers have called for a richer understanding of "what constitutes IT usage and the pattern

of IT infusion itself" (Chin and Marcolin 2001, p. 10). As reviewed earlier, scholars have proposed various concepts—e.g., deep structure use (Burton-Jones and Straub 2006), extended use (Hsieh et al. 2011), innovative use (Li et al. 2013), innovating with IT (Ahuja and Thatcher 2005), individual feature extension (Jasperson et al. 2005), and adaptive use (Sun 2012)—to describe IS use behaviors in the post-adoptive stage. These concepts all underscore the fundamental premise that the nature of employees' IS use changes as they gain more experience with an IS and that different constructs are required to describe the range of plausible behaviors as employees transition to the post-adoption stage. Our conceptualization of infusion use as employees' self-assessment of their use of an organizational system to its fullest potential recognizes that the ultimate state of IS use needs to be evaluated by the employees in their situational context. This conceptualization is a useful way to conceive when post-adoptive behaviors have attained the highest level of effectiveness from the vantage point of the user in a volitional use context and to evaluate the resulting downstream impacts.

While prior studies have identified the antecedents that stimulate these post-adoptive usage behaviors and sometimes their contingencies, IS usage behaviors that generate no performance impacts are of little theoretical and, especially, practical value (Brown et al. 2002). Thus, some have urged scholars to investigate whether post-adoptive use can indeed lead to fruitful outcomes (e.g., Li et al. 2013). In response, we examine actual performance outcomes by gathering feedback directly from the most important stakeholder group for service firms: customers. While prior studies (e.g., Feinberg and Kadam 2002) have found that customers' own use of CRM systems leads to customer satisfaction, our study makes contributions to the post-adoptive IS use literature on how the ***post-adoptive use*** of CRM by CS employees (who work inside the organization) enhances the satisfaction of customers (who are outside of the organization). As

such, this paper is among the first post-adoptive use studies that offer evidence regarding the effect of *internal employees' infusion use* on *external customer satisfaction.* Another contribution is the multi-source data collection design that measures performance impacts as personally reported by the firm's external customers (i.e., customer-reported satisfaction). The results provide convincing evidence that CS employees' infusion use of CRM systems leads to customer satisfaction. More interestingly, this happens in both face-to-face and virtual channels, but through different mechanisms. These encouraging findings give us great confidence about the value of focusing on infusion use when looking at post-adoptive use, suggesting a fruitful research direction that warrants further scholarly attention.

Taking it one step further, we discover two mechanisms through which CS employees' infusion use of CRM systems contributes to customer expectation confirmation. The first mechanism is a direct effect of infusion use on customer expectation confirmation, while the second mechanism is an indirect effect of infusion use on customer expectation confirmation via CS employee user satisfaction. By differentiating between the two mechanisms through which employees' infusion use of organizational systems creates performance impacts, we contribute to the post-adoptive literature and open avenues for further research on the mechanisms underlying the link from post-adoptive use to downstream performance outcomes, particularly when multiple stakeholders are directly or indirectly affected by how the system is used.

This finding about the direct and indirect effects of CS employees' infusion use of CRM systems on customer expectation confirmation becomes especially valuable when we compare these two mechanisms across face-to-face and virtual service channels. We elaborated our understanding of the mechanisms underlying the impacts of CS employees' infusion use of CRM systems in service encounters by uncovering the different importance of the direct and indirect

mechanisms across RCs and CCs. The results show that while the direct mechanism (i.e., infusion use → customer confirmation of expectation) plays a more important role in the RS channel, the indirect mechanism (i.e., infusion use → CS employee user satisfaction → customer expectation confirmation) plays a more critical role in the CC channel. Although CS employees' infusion use of CRM systems helps fulfill customer expectations and attain customer satisfaction, these results are achieved through different mechanisms in the face-to-face and virtual service channels. A key implication for research is that the channel in which a service encounter takes place plays a *contingent* role in determining the influential mechanisms through which CS employees' infusion use affects performance.

The revelation of this contingent role of the service channel advances our understanding of CRM payoff and has implications for **CRM-enabled multi-channel service research**. Although an increasing number of organizations have been implementing CRM systems, multiple studies that have examined the payoff of organizational CRM investment indicate that the payoff has been elusive (e.g., Coltman 2007; Hendricks et al. 2007). To develop a more nuanced insight into the nature of the payoff of CRM system investment, scholars have identified contingencies, such as a customer-oriented information process, that affect the CRM system payoff (e.g., Jayachandran et al. 2005). Along these lines, we differentiate between face-to-face and virtual service channels and identify these channels' media characteristics as contingencies that affect the relative importance of the mechanisms through which CRM system payoffs are achieved. In contrast to studies that provide insight into the consequences of the sequence in which different service channels are deployed (e.g., Ba et al. 2010, Scherer et al. 2015) or the consequences of the simultaneous use of different service channels (e.g., Dennis et al. 2008), we develop our understanding of the different strengths of the mechanisms through which payoffs (specifically

customer satisfaction) are achieved in face-to-face and virtual service channels.

An important cross-channel difference lies in the salience of the indirect effect of CS employees' infusion use on customer expectation confirmation. In general, the mediating role of CS employees' satisfaction with their CRM systems corresponds to the service-profit chain model (Heskett and Schlesinger 1994; Heskett et al. 1997) in which employees who are satisfied with their supportive work environment (e.g., their CRM systems) lead to satisfied customers. More importantly, this mediating effect is more salient in the virtual channel, where CS employees work in a highly monitored environment and interact remotely with their customers. Compared to the employees in RSs, employees in CCs are closely monitored with respect to their operational productivity (e.g., first call resolution) (Abdullateef et al. 2011; Cheong et al. 2008; Piercy and Rich 2009). However, employees' satisfaction with their job support, especially the service support enabled by their CRM systems, is relatively under-researched (Chicu et al. 2016). While prior studies have found that the operational productivity from using CRM systems may not necessarily fulfill customers' expectations (Chicu et al. 2016; Murray et al. 2004), our findings uncover that employees' satisfaction with their CRM systems is a key missing piece that nurtures customer expectation confirmation. In virtual channels where CRM systems are the only tool that employees can leverage for customer service, CS employees' satisfaction with their CRM systems becomes especially valuable for channeling the effect of infusion use of CRM systems to fulfill customers' expectations. This finding bears significant theoretical importance for many service industries, including education, entertainment, insurance, and financial services that are moving aggressively toward the virtual channel.

Further, we contribute to the **IS success literature** by showing that in CRM-enabled service encounters, the relevant success outcomes are *multi-stakeholder* in nature, involving both

customers' satisfaction with service encounters and CS employees' user satisfaction with the implemented CRM systems. These stakeholders are external and internal to the organization, and each may consider service encounters from a different point of view. A multi-stakeholder perspective—as adopted in our theory development—generates nuanced insights into the progression of benefits across stakeholders in CRM-enabled service encounters. Our results show that the impacts of CRMs on different stakeholders are not independent but interdependent, thus requiring elaboration on how we conceive IS success, which makes this study a unique contribution to this research stream. An important implication for the IS success literature is that future research on CRM-enabled services needs to elaborate the concept of IS impacts by identifying (1) the multiple stakeholders (e.g., customers and service employees), (2) the key outcomes for each stakeholder, and (3) the interdependencies among the set of multi-stakeholder outcomes. This has a direct implication for research design in that it requires data to be collected from various stakeholders, as we did for this study.

5.2 Implications for Practice

This research has important practical implications. Many organizations are troubled by low, no, or even negative returns on investment in complex information systems such as enterprise resource planning, supply chain management, CRM, and business intelligence systems. However, intense competition often forces these organizations to continuously invest a significant amount of resources on these systems. In this regard, the findings of our study offer concrete evidence that investment in complex organizational systems, including CRM systems, can indeed bring about positive impacts on key outcome variables such as customer satisfaction. The secret to attaining such positive outcomes lies in employees' achievement of *infusion use*, or using an IS to its fullest potential to best support their work. Most practitioners have realized that it is not the

implementation of an organizational IS per se, but rather achieving use of the IS to attain and serve organizational goals, that leads to success. As CS employees may exhibit various CRM use behaviors in the post-adoptive stage, managers should pay attention to the quality of IS use beyond the quantity of IS use (Boudreau and Seligman 2005; Hsieh and Wang 2007; Li et al. 2013). In particular, our study suggests that managers should recognize the importance of infusion use, the ultimate state of system use, by CS employees in service encounters. Merely using the system as a normal work routine is only the beginning, while using the system to its fullest potential to best support employees' work is the key to generating downstream benefits.

This study also has managerial implications for designing metrics to understand CRM system use and its ensuing impacts in multi-channel, multi-stakeholder contexts. First and foremost, our findings showcase the practical value of measuring how employees use CRM features as a whole to support their job (i.e., CS employee infusion use). Second, managers should assess the extent to which employees are satisfied with their CRM systems (i.e., employee user satisfaction), as employees' infusion use of and satisfaction with the system are both conducive to satisfying their customers. Third, measuring customer satisfaction with service encounters with CS employees provides critical evidence about whether CRM system use is achieving its objective of improving the customer experience. This holistic assessment approach, which considers employee system usage behavior, employee satisfaction with the system, and customer appraisals of service encounters with CS employees, is essential to ensuring that CRM systems are leveraged effectively and accruing benefits to key stakeholders, including employees and customers, synergistically.

This study also reveals that CRM systems can yield benefits in terms of increasing customer expectation confirmation, but through different mechanisms for different channels. The

direct effect of infusion use on customer expectation confirmation is stronger in face-to-face channels than in virtual channels, while the indirect effect through CS employee satisfaction is stronger in virtual channels than in face-to-face channels. These results shed light on how to effectively manage customer service in different channels. In particular, managers should not treat CRM systems as merely information provision platforms for helping CS employees serve customers. These systems also play a critical role in addressing the work morale of CS employees who will then better serve customers. The morale-heightening effect of CRM systems is especially important in virtual channels (e.g., CCs). In virtual environments, CS employees do not have face-to-face interactions with their customers, and thus the importance of CRM systems for building employee morale and making them excited about engaging with customers becomes salient. Our findings indicate that managers need to go beyond considering the information-provisioning effect of CRM systems and should not overlook their morale-heightening effect in customer service management in virtual channels. This discovery is especially valuable for managers in many service sectors, including education, entertainment, insurance, and financial services that are putting increasingly more emphasis on providing service in virtual channels.

The cross-channel differences in our research model also suggest that managers should not treat their investments across the channels the same. When considering the benefits for customers, managers can leverage different approaches to increase customer satisfaction across different channels. In particular, RS managers can strengthen employee training and even mutual learning regarding how to better use CRM systems to extract the fullest value. It is particularly important to conduct system maintenance and upgrades to ensure that the CRM functions match customers' needs and requests. CC managers should also focus on improving CS employees' user satisfaction rather than just familiarizing these employees with the CRM functions.

Furthermore, our findings pinpoint the importance of CS employee satisfaction with their IT-enabled work environment for the quality of customer service, especially in virtual channels. In practice, CC managers closely monitor CS employee productivity based on key performance indicators such as first call resolution, abandonment rate, percentage of calls blocked, and average speed of answers (Abdullateef et al. 2011; Cheong et al. 2008; Piercy and Rich 2009). However, prior research reveals that employee productivity based on these hard operational measures does not translate to customer satisfaction (Jaiswal 2008). Our findings suggest that CS employees who are satisfied with their supportive work environment (e.g., CRM systems) are critical for achieving customer satisfaction. Therefore, managers should not simply focus on increasing productivity indicators while ignoring employee satisfaction with core aspects of their work environment, as employee satisfaction is an essential indicator of the ultimate service performance that manifests as customer satisfaction.

Finally, to ensure effective service interactions across multiple channels, managers should be aware of the differences in channel capabilities for fulfilling service requirements. Face-to-face channels can transmit richer information cues during service and generate personal and cohesive communication patterns, whereas virtual channels—specifically, CCs—can transmit information without temporal-spatial constraints and generate focused and purposeful communication patterns. Every channel has strengths and weaknesses, and no single channel has the capabilities to meet diverse service requirements across a wide variety of business processes. In this vein, managers should pay attention to the service environment in which employees use CRM systems to communicate with customers. Eventually, the performance outcomes of the implemented CRM are affected by both how fully the system is used to support the work (i.e., infusion use) and the structural context (e.g., RSs or CCs) in which the system is leveraged.

5.3 Limitations and Future Research

Despite its contributions to theory and practice, our study has limitations that create opportunities for future research. First, conceptualizing constructs at the employee job level, we focus on the extent to which the gestalt of CRM features is used to fulfill employees' overall customer service job. A promising direction for future studies would be to examine infusion use from the development process perspective and investigate how infusion use of the system at the employee job level emerges from the use of CRM features, individually and in combination, over time across service encounters. It would also be interesting to uncover the similarities and differences in the development process of infusion use across service channels.

Second, this study considers CS employee user satisfaction and customer satisfaction as CRM system impacts. However, other important stakeholder benefits should also be further examined. For instance, the key objectives of using CRM systems include attracting new customers, retaining current customers, and enhancing customer value (Bolton and Tarasi 2006). Future studies should measure these potential benefits of CRM system use and examine how CS employees' CRM system use affects these outcomes. Similarly, there are other benefits of CRM system use for CS employees, such as productivity (Heskett et al. 2008). Future research should capture these factors to broaden our understanding of CRM systems' multi-stakeholder impacts.

Third, this study was carried out in only one firm in the telecom service industry. Nevertheless, we believe that the essence of employee–customer interactions is similar across many service sectors, such as financial services and insurance services, if not all sectors. Furthermore, since China has ascended to become one of the most important economies in the world, multi-national companies seeking to establish and enhance their position in the Chinese market should pay particular attention to research findings about this region. We encourage

interested scholars to conduct studies to further examine whether our proposed framework and hypotheses are applicable to other cultural and economic settings.

Fourth, our research context involves RSs and CCs, which respectively represent face-to-face and virtual service channels. They are also among the most widely used channels for service encounters in a variety of industries, including retail, telecom, banking, and insurance (Aberdeen Group 2012). We focused on one-to-one interactions between a CS employee and a customer using voice-based technologies (e.g., phone, internet telephony, VoIP). There exist new technologies that can support other types of interactions in virtual channels, such as one-to-many and many-to-many communications based on social media or text-based technologies (e.g., instant messaging, short message services, and web chats). Interested scholars can build on our work by further differentiating voice-based and text-based virtual interactions or conceptualizing employees' infusion use of platforms that integrate CRM systems with new technologies in order to evaluate the mechanisms through which the use of these platforms generates payoffs.

Fifth, we included various factors, such as customer heterogeneity, store heterogeneity, employees' demographic characteristics, and their experience with the CRM systems, to control for alternative explanations of the observed cross-channel differences. However, we recognize that we have not ruled out all potential unobservable differences between the two channels, given our research design. For example, there might be specific individual differences in information management effectiveness in terms of capabilities and motivations (Hwang 2016; Hwang et al. 2010; Hwang et al. 2015; Marchand et al. 2000). In particular, CS employees may have different personal capabilities to sense, organize, process, and maintain information in support of their jobs. Future studies might open the black box of individual differences and investigate the role of personal information management capabilities in generating high-quality service across channels.

Finally, we adopted a single-item measure for customer expectation confirmation. Although we have justified the appropriateness of such a measure in this study with theoretical and empirical evidence, we encourage future research to incorporate measures with multiple items to explicitly parse out measurement errors and assess the robustness of our findings.

6. Conclusion

Focusing on the ultimate state of post-adoptive IS use in the context of CRM-enabled service interactions, we uncover the mechanisms through which CS employees' infusion use of a CRM system creates impacts on different stakeholders in different channels. Our results reveal that CS employee infusion use of a CRM system can directly promote customer expectation confirmation and also indirectly do so via CS employees' satisfaction with the system. Moreover, the direct mechanism has a more critical role in face-to-face channels, while the indirect mechanism is more important in virtual channels. Employees' satisfaction with a CRM system is especially crucial in nurturing customer expectation confirmation in virtual channels, where face-to-face interactions are absent. Our findings contribute to the literature on IS use, IS success, CRM systems, and multi-channel service and shed light on the leverage points that practitioners can use to promote CRM-enabled service success in face-to-face and virtual service channels.

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Electronic Companion

Appendix A. Measurement Items of Latent Constructs in the Research Model

Survey of Customer Service Employees
CS Employee Infusion Use
1. I am using all functions of the CRM system in the best fashion to help me on the job.
2. My use of the CRM system on the job has been integrated and incorporated at the highest level.
3. I am using the CRM system to its fullest potential for supporting my own work.
(1 = strongly disagree; 7 = strongly agree)
(Sources: Jones et al. (2002), Schwarz (2003), Sundaram et al. (2007))
CS Employee User Satisfaction
1. I am very dissatisfied/very satisfied with the use of the CRM system.
2. I am very displeased/very pleased to use of the CRM system.
3. I am very frustrated/very content with the use of the CRM system.
(1 = very dissatisfied/displeased/frustrated; 7 = very satisfied/pleased/content)
(Sources: Bhattacherjee (2001), Au et al. (2008))
Survey of Customers
Customer Expectation Confirmation
1. To what extent did the service provide by the service employee on (time and date) at (xxx store or via the contact center) meet your expectations?
(1 = much worse than expected; 3 = as expected; 5 = much better than expected)
(Sources: Smith et al. (1999))
Customer Satisfaction
1. How did you feel about your experience with the service provided by the service employee on (time and date) at (xxx store or via the contact center)?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Not at All Satisfied   Half/Half   Completely Satisfied

2. Using a 10-point scale where 1 means "very dissatisfied" and 10 means "very satisfied," how satisfied are you with the service provided by the service employee?

(Sources: Bitner and Hubbert (1994), Smith et al. (1999))

Appendix B. Correlations

Table B1. Correlation Table for Retail Store

	CS Employee Infusion Use	CS Employee User Sat	Cust Expect Confirm	Cust Sat	Gender	Edu	Age	CRM Sys Use Exp	Serv Exp	Work Time Using Sys	Prior Work Perf	Store Ave Cust Conf	Store Ave Cust SAT	CS Employee Ave Cust Gender	CS Employee Ave Cust Age
CS Employee Infusion Use	**0.87**														
CS Employee User Sat	0.49	**0.92**													
Cust Expect Confirm	0.20	-0.01	**N.A.**												
Cust Sat	0.15	0.04	0.53	**0.83**											
Gender	-0.04	-0.01	-0.06	-0.11	**N.A.**										
Edu	0.04	-0.07	0.01	-0.01	0.12	**N.A.**									
Age	-0.12	-0.14	-0.07	-0.07	0.16	0.14	**N.A.**								
CRM Sys Use Exp	-0.09	-0.10	-0.03	0.04	-0.10	-0.22	0.05	**N.A.**							
Serv Exp	-0.07	-0.10	-0.04	-0.02	-0.14	-0.32	0.38	0.41	**N.A.**						
Work Time Using Sys	0.09	0.12	-0.02	-0.07	-0.12	0.00	-0.04	-0.10	0.00	**N.A.**					
Prior Work Perf	-0.06	-0.06	-0.19	-0.08	0.07	0.10	0.16	0.08	0.01	-0.12	**N.A.**				
Store Ave Cust Conf	-0.04	0.00	0.05	0.05	0.04	0.03	-0.07	-0.04	-0.02	-0.07	-0.06	**N.A.**			
Store Ave Cust Sat	-0.09	-0.12	-0.01	-0.06	0.04	0.08	0.05	0.01	0.06	-0.12	0.05	0.49	**0.85**		
CS Employee Ave Cust Gender	0.04	0.03	-0.01	0.04	0.05	0.06	-0.09	0.03	-0.01	-0.03	-0.14	0.10	0.08	**N.A.**	
CS Employee Ave Cust Age	-0.05	0.06	-0.12	-0.15	0.00	-0.13	-0.02	0.00	-0.10	0.03	0.06	-0.01	0.00	-0.11	**N.A.**

Note: 1. Diagonal items are the square root of AVE.   2. Shaded cells represent significant correlations.

CS Employee User Sat: customer service employee user satisfaction

Cust Expect Confirm: customer expectation confirmation

CRM Sys Use Exp: CRM system use experience

Serv Exp: service experience

Prior Work Perf: prior work performance

Store Ave Cust Conf: store average customer expectation confirmation

Store Ave Cust Sat: store average customer satisfaction

Table B2. Correlation Table for Contact Center

	CS Employee Infusion Use	CS Employee User Sat	Cust Expect Confirm	Cust Sat	Gender	Edu	Age	CRM Sys Use Exp	Serv Exp	Work Time Using Sys	Prior Work Perf	Store Ave Cust Conf	Store Ave Cust SAT	CS Employee Ave Cust Gender	CS Employee Ave Cust Age
CS Employee Infusion Use	**0.84**														
CS Employee User Sat	0.46	**0.92**													
Cust Expect Confirm	0.03	0.19	**N.A.**												
Cust Sat	-0.02	0.01	0.38	**0.80**											
Gender	0.15	0.07	-0.12	-0.17	**N.A.**										
Edu	-0.14	-0.21	-0.10	-0.03	-0.13	**N.A.**									
Age	-0.13	-0.04	0.04	-0.09	0.13	0.13	**N.A.**								
CRM Sys Use Exp	-0.02	-0.05	-0.10	0.00	0.06	-0.09	0.27	**N.A.**							
Serv Exp	-0.02	-0.08	-0.03	0.04	0.23	-0.25	0.40	0.50	**N.A.**						
Work Time Using Sys	0.01	0.01	-0.07	-0.02	-0.03	0.04	0.05	0.05	0.09	**N.A.**					
Prior Work Perf	-0.03	0.07	-0.10	-0.06	0.01	-0.04	-0.02	-0.07	-0.18	0.05	**N.A.**				
Store Ave Cust Conf	0.08	0.00	0.00	-0.13	0.10	0.00	0.05	0.00	-0.07	-0.14	-0.03	**N.A.**			
Store Ave Cust Sat	0.00	-0.04	-0.14	-0.12	0.04	0.01	0.03	0.02	-0.11	0.06	-0.07	0.33	**0.79**		
CS Employee Ave Cust Gender	0.09	0.11	0.08	0.07	-0.01	0.08	-0.02	-0.01	-0.04	-0.05	-0.01	-0.04	-0.11	**N.A.**	
CS Employee Ave Cust Age	0.11	0.14	-0.06	0.00	0.11	-0.12	-0.07	0.07	0.02	-0.02	0.05	-0.15	-0.07	-0.06	**N.A.**

Note: 1. Diagonal items are the square root of AVE.   2. Shaded cells represent significant correlations.

CS Employee User Sat: customer service employee user satisfaction
Cust Expect Confirm: customer expectation confirmation
CRM Sys Use Exp: CRM system use experience
Serv Exp: service experience
Prior Work Perf: prior work performance
Store Ave Cust Conf: store average customer expectation confirmation
Store Ave Cust Sat: store average customer satisfaction

Appendix C. Measurement Invariance Analyses

To evaluate the appropriateness of comparing path coefficients across RSs and CCs, we applied multi-group measurement invariance analyses, including tests for configural invariance and metric invariance (Doll et al. 1998; Steenkamp and Baumgartner 1998).

Configural invariance denotes that the patterns of item loadings are congeneric across groups (Doll et al. 1998; Steenkamp and Baumgartner 1998). No restrictions are imposed on the metrics across groups when modeling configural invariance (Doll et al. 1998).

Next, metric invariance determines whether items have equal loadings between groups. Item loadings are set to be equivalent across groups when modeling metric invariance. If the change in CFI between these two nested (configural and metric) models is smaller than the suggested threshold of 0.01 (Cheung and Rensvold 2002), then metric invariance is supported, permitting the path coefficient comparison between groups.

Using AMOS 20.0, we performed the configural and metric invariance analyses to evaluate if the measurement models are invariant across the RS and CC channels. As shown in Table C1, the results show acceptable measurement model fit for both configural and metric invariance analyses. Importantly, from configural to metric invariance, CFI decreased from 0.987 to 0.986, representing a change of 0.001. Given that the change in the CFI of the nested models was much smaller than the recommended 0.01 (Cheung and Rensvold 2002), metric invariance was established, providing support for meaningful path coefficient comparison across the two channels.

Table C1. Measurement Invariance Analysis

Goodness of Fit Indices	RSs versus CCs		Desired Level
	Configural Invariance	Metric Invariance	
X^2 / D.F.	1.83	1.97	< 3
TLI	0.988	0.986	> 0.9
CFI	**0.987**	**0.986**	> 0.9
SRMR	0.0240	0.0312	< 0.08
RMSEA	0.033	0.034	< 0.08

Appendix D. Testing the Indirect Effect of Infusion Use via User Satisfaction

Our empirical results (Figure 4) show that:

- In RSs, there is a significant path from infusion use to user satisfaction ($\beta = 0.47$, $p < 0.01$), and there is a non-significant path from user satisfaction to customer expectation confirmation
- In CCs, there is a significant path from infusion use to user satisfaction ($\beta = 0.47$, $p < 0.01$), and there is also a significant path from user satisfaction to customer expectation confirmation in ($\beta = 0.22$, $p < 0.05$)

One commonly used approach to test indirect effects is the product-of-coefficients approach (MacKinnon et al. 2002), generally known as the Sobel test (Sobel 1982). We followed the procedures suggested by Taylor et al. (2008) to perform a series of Sobel tests for this two-path mediation in both RSs and CCs. The results show that the indirect effect of infusion use on customer expectation confirmation via user satisfaction in CCs (i.e., 0.47×0.22) is significant at the $p < 0.05$ level. The indirect effect in RSs is not significant ($p > 0.1$).

Although the Sobel test has been widely applied, this product-of-coefficients approach assumes that the sampling distribution of the indirect effect is normal. However, the distribution of the product of the two estimated coefficients tends to be asymmetric with non-zero skewness and kurtosis (Bollen and Stine 1990; Stone and Sobel 1990), thus leading to criticism of the approach. Of the alternatives, bootstrapping is a non-parametric resampling method that does not impose the assumption of normality of the sampling distribution (Manly 1997; Hayes 2009; Preacher and Hayes 2008).

Following these suggestions, we used the bootstrapping approach described by Taylor et al. (2008) to test the indirect effects. Our results show that:

- In CCs, the indirect effect, again, is significantly positive ($\beta = 0.20$, $p = 0.015$), with a 95% bias-corrected bootstrap confidence interval of 0.021 to 0.19
- In RSs, the indirect effect is not significant ($\beta = 0.03$, $p = 0.326$), with a 95% bias-corrected bootstrap confidence interval of -0.116 to 0.029

Appendix E. Garen Test to Address Endogeneity Concerns

A common approach to address endogeneity concerns is to conduct a two-step Heckman analysis (Heckman 1979; Bharadwaj et al. 2007; Hsieh et al. 2011). However, the two-step Heckman analysis (Heckman 1979) can only be used to correct for endogeneity in discrete variables. Toward this end, the Garen test (Garen 1984; Garen 1988) allows to address endogeneity in a continuous variable, if any, which aligns with the nature of our variable infusion use.

Following Mooi and Ghosh (2010) and Carson and John (2013) that applied the Garen procedure (Garen 1984, 1988), we performed the analyses in the following three steps. First, because the Garen analysis employs regression as the statistical technique, we used construct scores, computed as the mean values of multi-item measures, to replicate our model with infusion use and user satisfaction, as the independent and dependent variable, respectively, together with the other control variables for the CS employee user satisfaction listed in Figure 4. The results of the multiple regression analysis (Columns 1-1 and 1-2 of Table E1) are highly consistent with our structural equation modeling results in Figure 4 for both RSs and CCs.

Next, we constructed the first stage model to apply the Garen procedure. Infusion use may be endogenous in our models in two ways: (1) we may not have accounted for all unobserved heterogeneity associated with infusion use; and (2) reverse causation may be present as CS employees' user satisfaction may impact their infusion use. Accordingly, we identified routine use as an instrumental variable for infusion use. Our detailed review of prior research on infusion use suggests that routine use is the most important factor leading to infusion use (Sundaram et al. 2007). To implement this research design, we collected data for routine use at T0 (as described earlier in the data collection procedure). Therefore, we regressed infusion use on routine use, user satisfaction, and all the control variables as the first-stage Garen analysis model. The results (Columns 2-1 and 2-2 of Table E1) showed (a) a positive influence from routine use to infusion use for both RSs and CCs, which is consistent with prior literature (Sundaram et al. 2007), and (b) a positive influence from user satisfaction to infusion use ($p < 0.01$) for both RSs and CCs, suggesting that infusion use could be endogenous.

For the second step of the Garen analysis, we included (a) the residual derived from the first step of this analysis and (b) the product of the residual and infusion use in the proposed model (i.e., Columns 1-1 and 1-2) to control for the impact of endogeneity. After the two aforementioned variables were controlled for, the coefficients of infusion use remained qualitatively unchanged (Columns 3-1 and 3-2 of Table E1). This suggests that our conclusions about the role of infusion use in explaining user satisfaction hold true after controlling for the endogeneity of infusion use.

Table E1. Results of the Garen Analysis

Columns / Predictors	(1-1) OLS	(1-2) OLS	Garen Analysis—Step 1 (2-1) Stage 1: OLS	(2-2) Stage 1: OLS	Garen Analysis—Step 2 (3-1) Stage 2: FGLS	(3-2) Stage 2: FGLS
	DV = UserSat	DV = UserSat	DV = InfU	DV = InfU	DV = UserSat	DV = UserSat
Instrumental Variable						
Routine Use			.441 **	.369 **		
Endogenous Factor:						
User Satisfaction (UserSat)			.330 **	.310 **		
Residual					-.1.334 **	-1.316 *
Residual x Infusion Use					-.0.90 *	-0.028
Antecedents of User Satisfaction						
Infusion Use (InfU)	0.433 **	0.435 **			1.265 **	1.305 **
Controls						
Prior Usage Experience	-0.01	0.13	-0.052	-0.011	0.011	0.023
Prior Service Experience	-0.09	-0.12	0.038	-0.030	-0.007	-0.004
Gender	-0.02	-0.03	-0.026	0.101	0.062	-0.885 *
Age	-0.05	0.13	-0.090	-0.103	0.025	0.085
Education	-0.09	-0.13	0.063	-0.028	-0.232 *	-0.018
Prior Work Performance	0.04	0.05	-0.013	-0.057	0.065	0.099
Work Time Using the System	0.04	0.01	-0.04	-0.023	0.136	-0.086
R-Square	24.9%	22.3%	39.6%	35.0%		
Model Fit (Likelihood Ratio Chi-Square)					178.06.95 **	179.46 **
Degree of Freedom (D.F.)					10	10
P-Value					P = 0.000	P = 0.000

Note: Unstandardized beta coefficients reported
*p < 0.05, **p < 0.01